Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

JUNE, 1939

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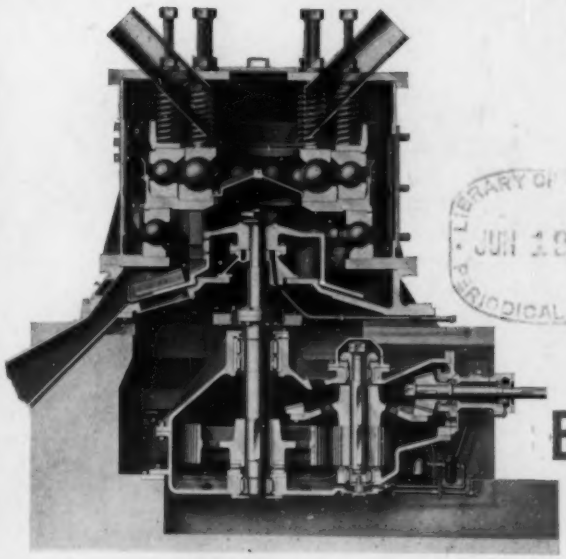


Drying and Grinding are accomplished Simultaneously Automatically and Economically within the

B&W Closed-Circuit System

Elimination of dryers removes a troublesome department, reduces costs, gets rid of dust.

The material being pulverized is in almost constant suspension and is therefore in intimate contact with hot gases at all times. This is an exclusive feature which is largely responsible for the success of the B & W System. With the B & W System there is a substantial circulating load—hence a thoroughly mixed product.

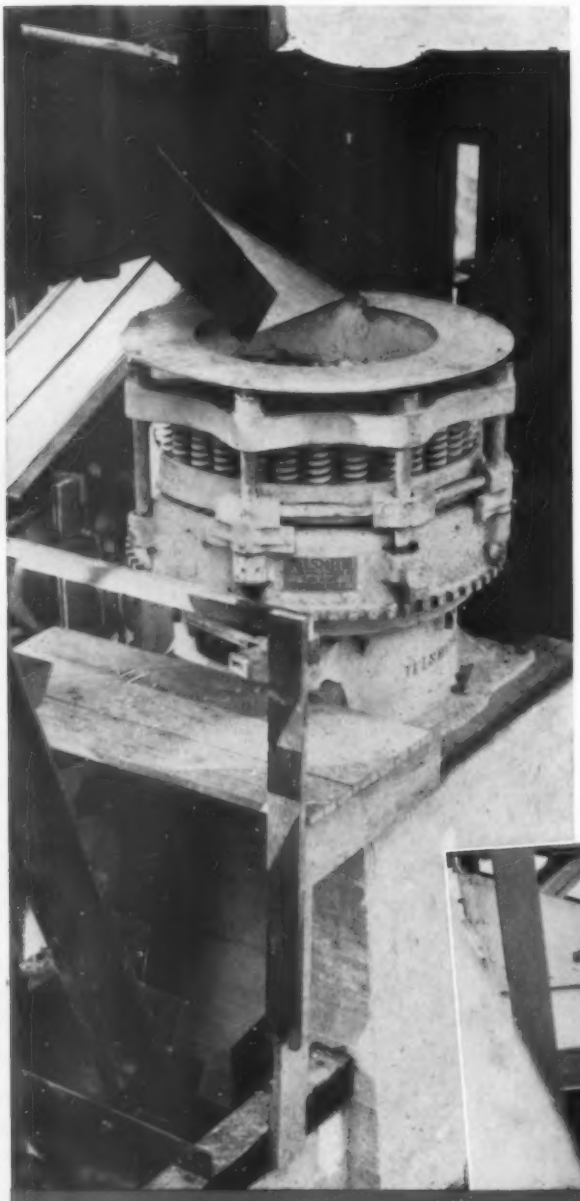
Power costs are low, and oil consumption is approximately 0.3 gal. per ton of material. Write for Bulletin 3-253.

(Above) Cut-away view of the B & W Pulverizer, Type B. (At right) Oil Furnace which supplies heated air for drying within the B & W Closed-Circuit System.

The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y.

BABCOCK & WILCOX

TELSMITH
is PROFIT EQUIPMENT
FOR THE MUSKOGEE GRAVEL COMPANY



● In a gravel plant, performance depends on equipment . . . profits depend on costs. The Muskogee Gravel Co., Muskogee, Oklahoma, has operated its Telsmith plant for over a year. "It has always performed satisfactorily in every way," says Manager A. O. Walker. "Maintenance has been at a minimum, and we are very well pleased with the operation and production costs.

"We are especially well pleased with the improved type Gyrasphere Crusher . . . it is showing very little wear or depreciation." This, in spite of a very wet feed—the supreme test of effective sealing and lubrication! For intermediate and fine crushing, it crushes faster, with less power, turning out larger tonnage and a finer product. Like a mortar and pestle . . . only inverted for easy discharge . . . the spherical head and its corresponding concave catch and break chunks of rock between two multi-curved surfaces—a perfect *cubing* action. *Write for free Bulletin Y-11.*

In this plant, a Telsmith Pulsator screens sand, gravel and crushed rock, wet or dry, and does it *right.* Its circular movement produces a maximum screening action that's *uniform* on every inch of the wire regardless of load. The toughest alloy steels, anti-friction bearings and special seal protection for working parts give it longer life and lower up-keep. *Get the details in free Bulletin V-11.*

Telsmith complete pit or quarry plant service is described in *free Bulletin E-11.*

MC-11-39

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30 Church Street, New York City | 211 W. Wacker Drive, Chicago, Ill. | 713 Commercial Trust Bldg., Philadelphia, Pa. | 81 Binney Street, Cambridge, Mass. | 412 Westinghouse Bldg., Pittsburgh, Pa. | Brandeis M. & S. Co., Louisville, Ky.

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Then Pioneer can help you —
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Third, because Pioneer manufactures all the units and designs the plant, you have one manufacturer responsible for its operation and service.
Pioneer standard units, supported by this Pioneer service, will help you answer your problem.

PIONEER

PIONEER ENGINEERING WORKS · MINNEAPOLIS, MINNESOTA, U. S. A.

JUN -5 1939

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Rock Products

With which has been consolidated the journals

CEMENT and ENGINEERING NEWS — Founded 1896

CONCRETE PRODUCTS — Est. 1918

Recognized the World Over as the Leader in Its Field

VOL. 42 CHICAGO, JUNE, 1939 No. 6

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2, 3, 4 Cockspur St., S.W. 1, England

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ROCK PRODUCTS
Bears the Twin Hall-Marks of Known Value

Impartial measurement of reader interest in terms of paid circulation

Authentic facts relating to editorial scope and readership analysis

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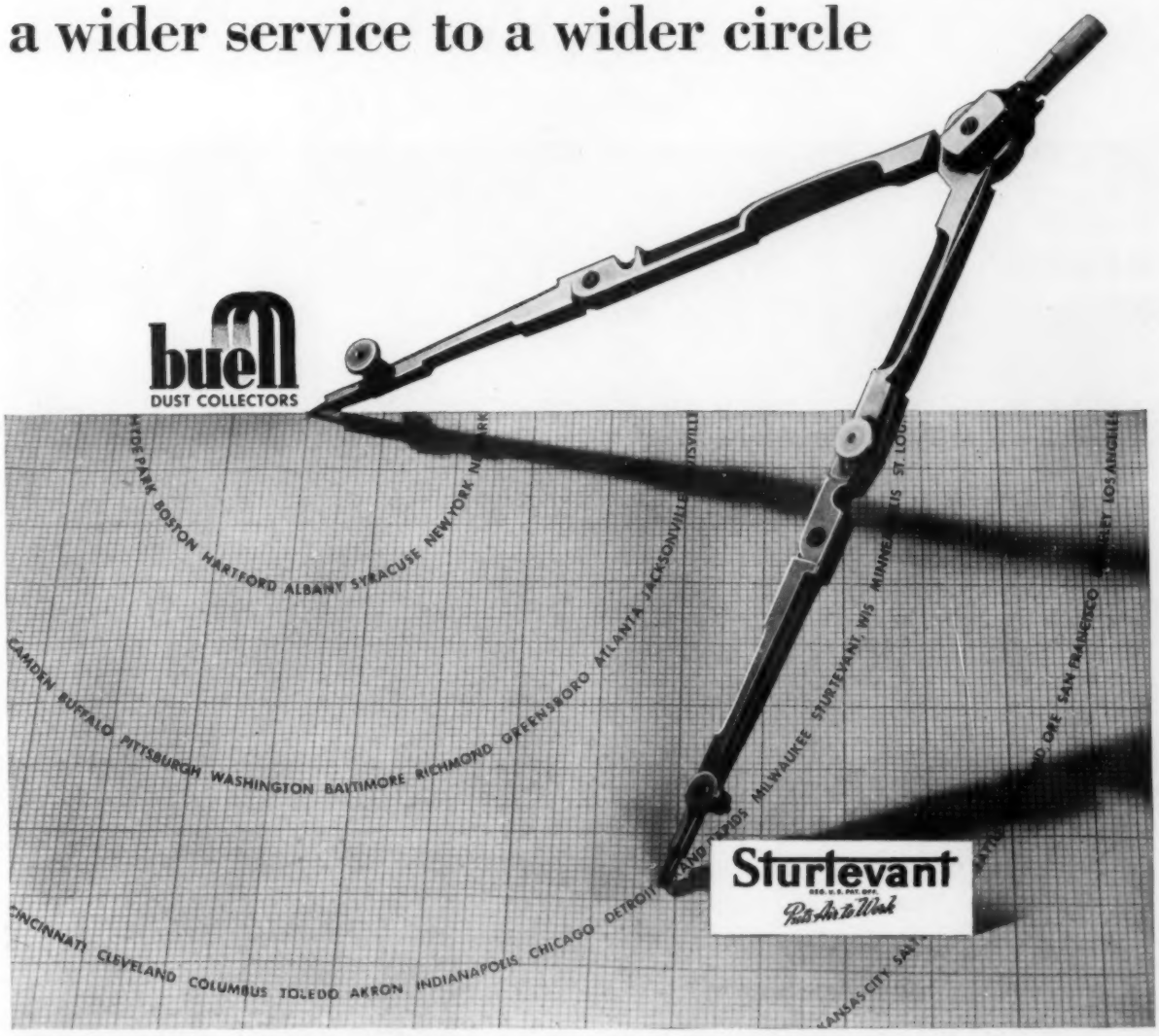
Now STURTEVANT and BUELL bring a wider service to a wider circle



When H. Van Tongeren worked out in Holland those principles of advanced aerodynamic design which are associated with his name and applied them to dust collection, the efficiency of the cyclone was markedly increased, the range of its usefulness greatly widened.

When the Buell Engineering Company, sole American licensee under the Van Tongeren patents, made the new type of cyclone available to the industries of this country, the circle of users quickly widened and the need for a wider field service became apparent.

Today that need is met. The B. F. Sturtevant Company is now complementing Buell's own service through the 40 Sturtevant offices—complementing, too, the Buell Dust and Fly Ash Collectors with Sturtevant's many types of related equipment.

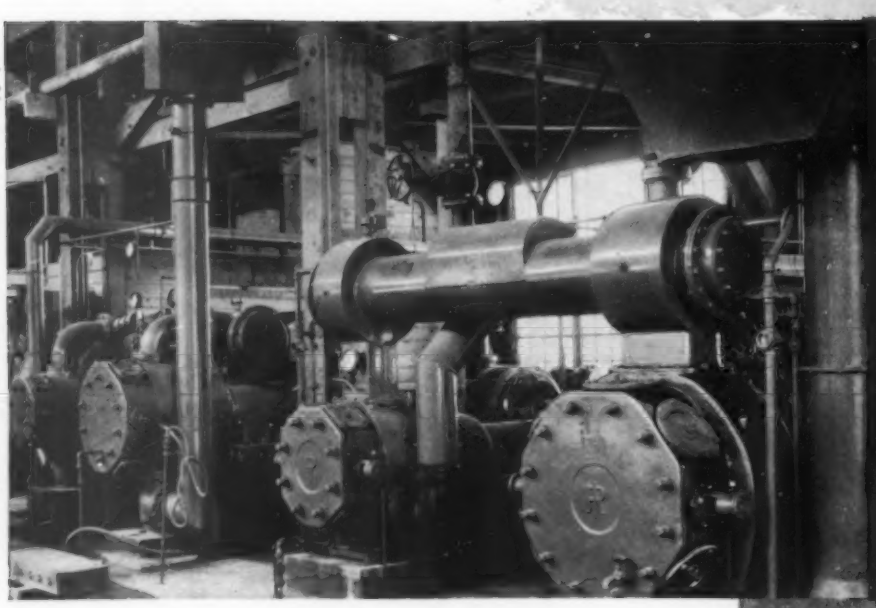
No matter where you are located you can now be sure to find, close at hand, a coordinated service rendered by engineers who are thoroughly qualified not only to discuss with you your dust collection and fly ash problems, but also to aid you in the selection of any necessary fan equipment.

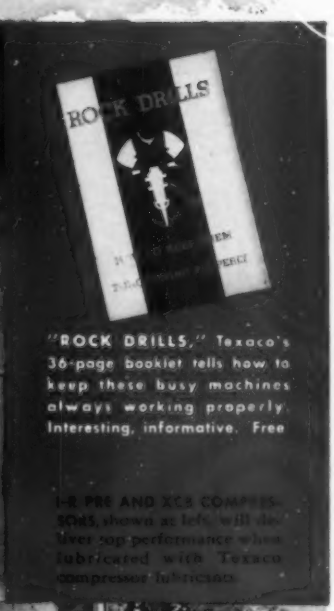
THE ONLY CYCLONES WITH A DUST POCKET • MORE THAN 1100 IN USE

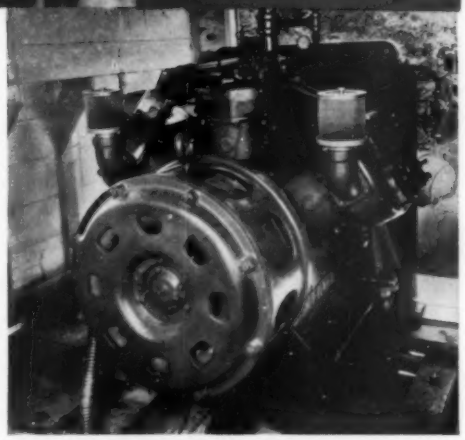
FOR INFORMATION on dust collection ask us for *Bulletin D81*; on fly ash, for *Booklet A93*. Either, or both, will be sent free to any managing executive or operating engineer.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS. ✣ BUELL ENGINEERING COMPANY, INC., SUITE 5000, 2 CEDAR STREET, NEW YORK

VALVES KEEP CARBON FREE




ROCK DRILLS
"ROCK DRILLS," Texaco's 36-page booklet tells how to keep these busy machines always working properly. Interesting, informative. Free



GARDNER-DENVER COMPRESSORS, above, keep on the job, when lubricated with Texaco compressor lubricant of the proper viscosity grade.

YOUR COMPRESSORS will give you little or no trouble when their valves are working properly.

To keep valves at their best, lubricate your compressors with Texaco Alcaid, Algol or Ursa Oils.

These oils assure valves that keep free from gummy deposits, valves that open wide and close air-tight.

These oils also keep rings free in the grooves, maintaining piston seal.

Our lubrication engineers will be glad to demonstrate the savings Texaco compressor lubricants can make for you. Prompt engineering service and deliveries are available by phoning the nearest of 2229 Texaco warehouses, or write—

The Texas Company, 135 East 42nd Street, New York City.

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9 E.D.T., 8 E.S.T., 8 C.D.T., 7 C.S.T., 6 M.S.T., 5 P.S.T.

TEXACO

TEXACO Alcaid, Algol and Ursa Oils

PERFECTED LUBRICATION FOR COMPRESSORS

A MONEY MAKER FOR KNOXVILLE SANGRAVL MATERIAL COMPANY

● Less than sixteen miles from their half million dollar gravel plant, the Knoxville Sangravl Company set up an Austin-Western crushing and screening plant to handle 80,000 tons of gravel dredged from the Tennessee River. Easily producing 75 to 100 tons of acceptable size material per hour, the company showed a satisfactory profit on the operation.

The Knoxville Sangravl Company's experience is a concrete example of the profits a fixed plant producer can secure from portable plant operation.

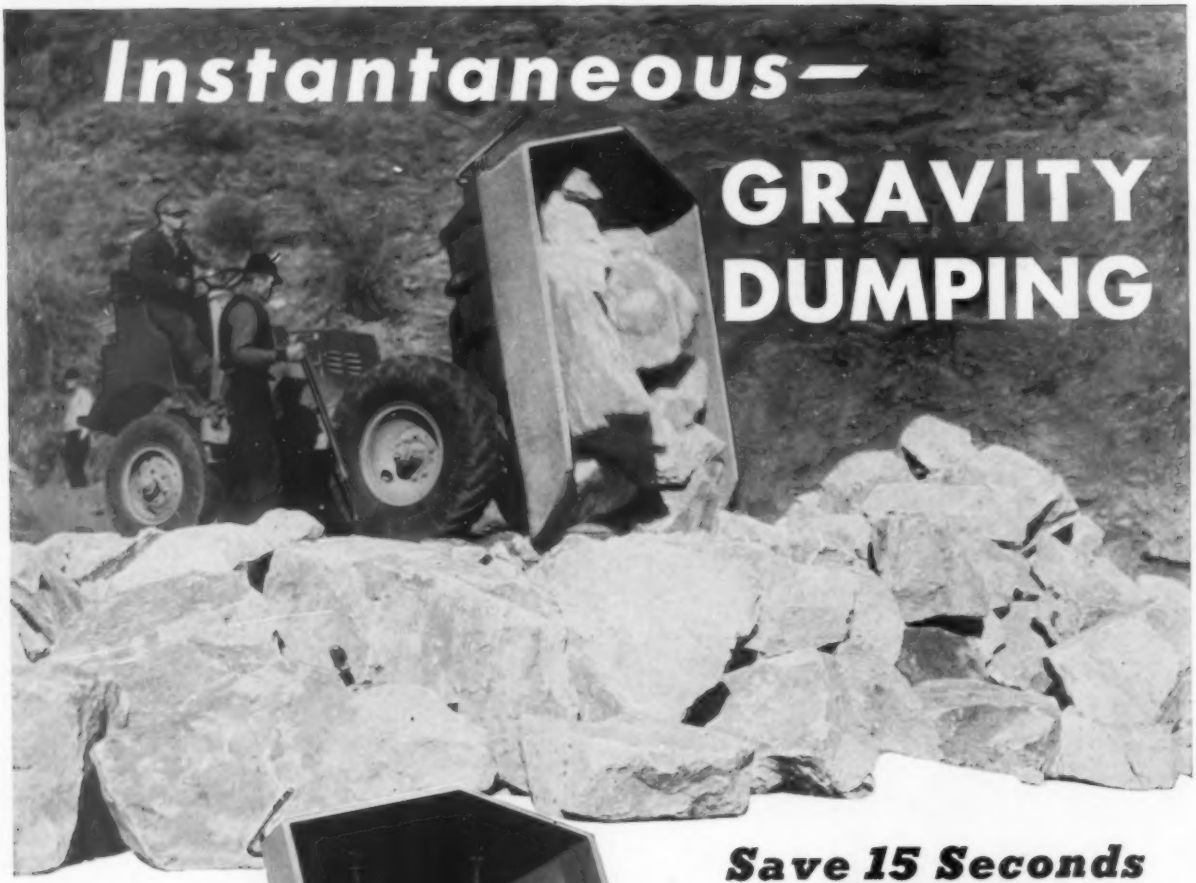
High output and low maintenance are assured, for the deep jaws, operating at unusually high speeds on oversize shafts and oversize bearings are so carefully designed and well made that, size for size, they outperform and outlast all other jaw crushers in fixed or portable plants. The screens, conveyers, etc., are ruggedly built and designed to put out aggregate at top speed, no bottle necks to choke production.

Readily portable on pneumatic tires, there is a portable plant to meet any capacity you require. Ask us to send you details on profits from portable plant operation.

The AUSTIN-WESTERN
ROAD MACHINERY CO., Aurora, Illinois

Motor Graders	Crushing and Screening Plants	Motor Sweepers	5-Yard Tractor-Scraper
Roll-A-Planes	Washing Plants	Shovels and Cranes	6-Yard Tractor-Scraper
Rollers	Blade Graders	Bituminous Distributors	8-Yard Tractor Scraper
Snow Plows		Elevating Graders	12-Yard Hydraulic Scraper

KOEHRING



Approximately 90° dumping angle of body combined with automatic kick-out pan for thorough cleaning of sticky material, means complete and speedy dumping.

Save 15 Seconds Per Load

Seconds Saved Are Profits Earned

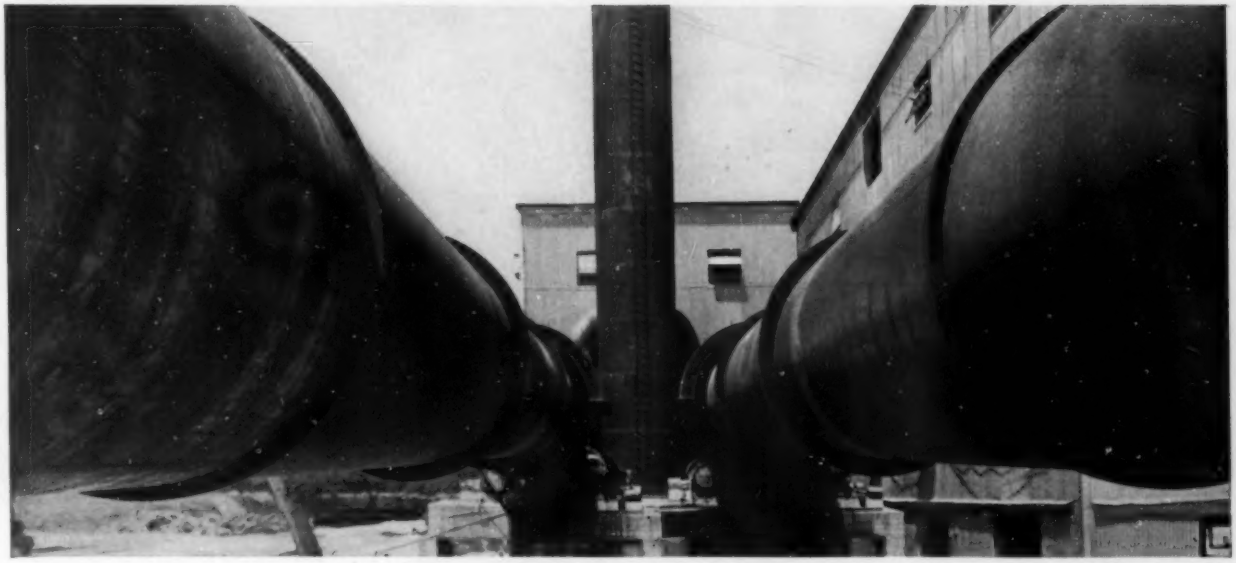
Instantaneous gravity dump on Koehring Dumptors is speedy—so fast that the sturdy Heavy-Duty body is in maximum dumping position at the instant the material starts to slide. Above illustration proves this fact. No intricate mechanical parts to impede the natural gravity action or cause delays for repairs.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY-DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

EXPERIENCE
plus
REPUTATION
plus
ENGINEERING ABILITY
plus
FINEST WORKMANSHIP
equal
TRAYLOR LEADERSHIP!



Traylor always "makes good" all of its promises and claims. It has many years of experience that enable correct understanding of the problems of lime and cement manufacturers, and possesses the engineering ability to design equipment properly solving said problems and manufacturing facilities to translate these designs into machinery that always functions at a profit.

So, when installing Traylor Kilns, Coolers, Dryers and Grinding Mills, operators secure the finest and most trustworthy at a price no higher than ordinary machinery, which is as wise an investment as anyone can make!

Write us today about your problem—we'll solve it!

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

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Thrills

...for you and your family at the New York World's Fair!

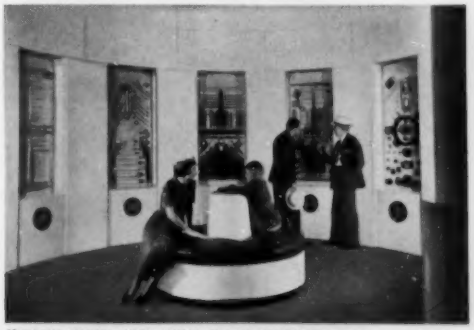
WHEN YOU COME—BE SURE TO VISIT THE ROEBLING EXHIBIT!

©N.Y.W.F.

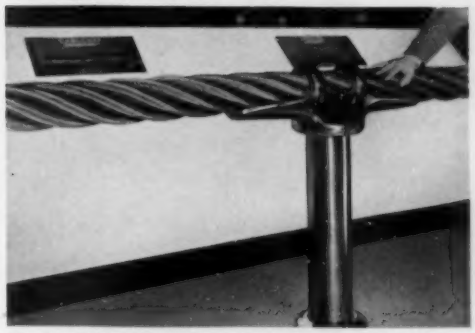
"THIS WILL INTEREST YOU, JOHNNY . . . a whole village in miniature. See, there's a school, a church, a fire house, some stores—even a water tower and a railroad station. And look . . . here comes the train!"

"THAT, MY DEAR, is the world's largest dredge, the Crest. I've seen her—and this replica sure looks natural. Why, it's identical with the original, down to the last boom line and hoisting rope!"

"I WANT YOU TO SEE THIS, JACK. It's that Roebling Passenger Tramway I was talking to you about. Somebody used his head when he put in these blueprints so engineers can study the construction details."



"WHILE MARY AND JOHNNY ARE RESTING, suppose you and I look over this interesting exhibit of Roebling Products. There are more of them in the other rotunda, at the opposite end of the exhibit."



"NOW, HERE'S SOMETHING! This wire rope is 5½ inches in diameter! I'm told it is one of the largest wire ropes ever made by machine—and it surely looks the part."

THE METALS BUILDING is easy to locate and quick to reach. It is situated directly in front of the Trylon and Perisphere—the theme center of the New York World's Fair.

TO YOU and your family . . . a hearty invitation to visit the Roebling Exhibit at the New York World's Fair!

No matter what your business activity . . . engineering, contracting, mining, railroading, manufacturing, building management or what-not . . . you will find that this Roebling Exhibit is designed specifically to interest *you*—to help make *your* visit instructive and keenly enjoyable.

Action every moment! Mining, construction, dredging and other industrial operations in full swing! All in miniature . . . with excavating, hoisting, and conveying equipment incredibly exact in detail. Even the tiny wire ropes and cables are exact duplicates of their full-size counterparts!

So come . . . you and your family. We will give you a royal welcome. And remember . . . we are in the Metals Building, directly in front of the Trylon and Perisphere.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N. J., *Branches in Principal Cities.*

ROEBLING

WIRE ROPE & FITTINGS • ELECTRIC WIRE & CABLE • FLAT WIRE • WOVEN WIRE FABRICS • WELDING WIRE • OTHER WIRES & WIRE PRODUCTS

When you've got a tough job to do, you put a Ford on it. Naturally. You need Ford stamina and strength. You like the smooth power output of Ford V-8 engines. And now, teamed with the ruggedness of Ford chassis, is the extra power of the new 95-hp. V-8 engine available in all Regular and C. O. E. Trucks. 10 more horsepower and 13.3% more torque than the "85" mean more speed when you need it, and more pulling ability when your loads call for it.

• Best of all, it's already proved itself an economical engine. With its ability to get a job done in short order, it makes money. And it saves money because it really is easy on gas and oil.

• See your Ford dealer about an "on-the-job" test. You can try before you buy, without obligation or expense.

• • •

Ford Motor Company • Builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons and Transit Buses

CHECK YOUR TRUCK AGAINST THESE QUALITY FORD FEATURES!

V-8 ENGINES—95 (available in all Regular and C. O. E. Trucks), 85, 60 hp.—Smooth, dependable, low-cost power. Quality materials and precision workmanship for efficient operation and long life.

SEMI-CENTRIFUGAL CLUTCHES—Non-tiring pedal action. Centrifugal force provides tremendous power-transmitting capacity. Up-keep costs kept at a minimum.

STURDY, TROUBLE-FREE TRANSMISSIONS—Large roller and ball bearings for all forward speeds reduce friction, save power. Oil-hardened chromium-steel gears for long service.

FULL TORQUE-TUBE DRIVE—Springs relieved of driving and braking stresses provide better cushioning of truck and its load. Shackle-bolt wear reduced, spring life prolonged.

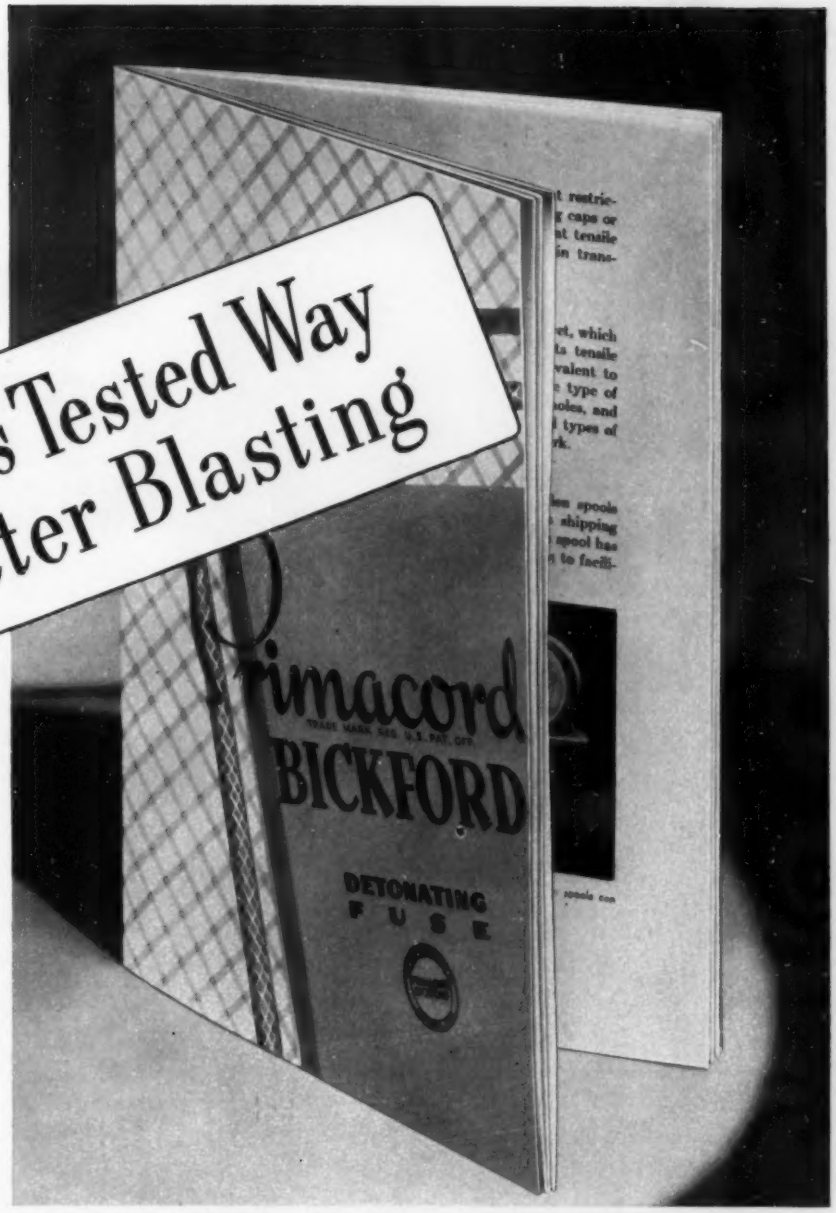
RUGGED REAR AXLES—Driving pinion is straddle-mounted to maintain gear-tooth alignment. All truck axles are full-floating, with weight carried on axle housing—none on axle shafts. These features increase dependability and long service, reduce up-keep expense.

BIG, POWERFUL HYDRAULIC BRAKES—Equalized braking action for straight stops. Big brake-drum diameters and large lining areas for long brake life and low-cost maintenance.

• • •

In every detail, the quality of all Ford cabs and bodies matches the high quality of Ford chassis. Their exceptional durability means long service with low up-keep cost.

NEW 95-HP. FORD V-8 HEAVY-DUTY TRUCK ENGINE



Primacord is *performance-proved*—tried and tested on all sorts of blasting jobs and found successful in every way. This insensitive high-velocity detonating fuse, with a core of PETN in a waterproof textile covering, is tough, flexible, easy to handle and amazingly effective. It saves time in loading and connecting up holes—develops more work from explosives. Use Primacord to reduce costs, get better results and safeguard your profits.

Be sure to get your copy of the Primacord-Bickford Booklet, which gives complete information on this improved detonating fuse.

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONN., U.S.A.

Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse Since 1836

PRIMACORD-BICKFORD *Detonating Fuse*

PB9

PURPLE-STRAND *FORM-SET* WIRE ROPE

Made of premium-price extra-tough steel

EVERY pound of steel that goes into Purple-Strand rope would command an extra price on the open market, for extra care and extra time are required in steel-making departments to produce this metal. Special furnaces, reserved for the out-of-ordinary job, are used. Special practices, carried out under strict metallurgical observation, are observed at these furnaces, at the soaking pits, and in the rolling mills.

The result is a superior steel, the first requirement for superior rope. This steel, drawn into wire, has more than four times the strength of structural steel. It has a toughness far exceeding any ordinary steel. Its fatigue resistance is exceptional. And above all, because of close control and a strict schedule of testing, these qualities are the same in mile after mile of wire.

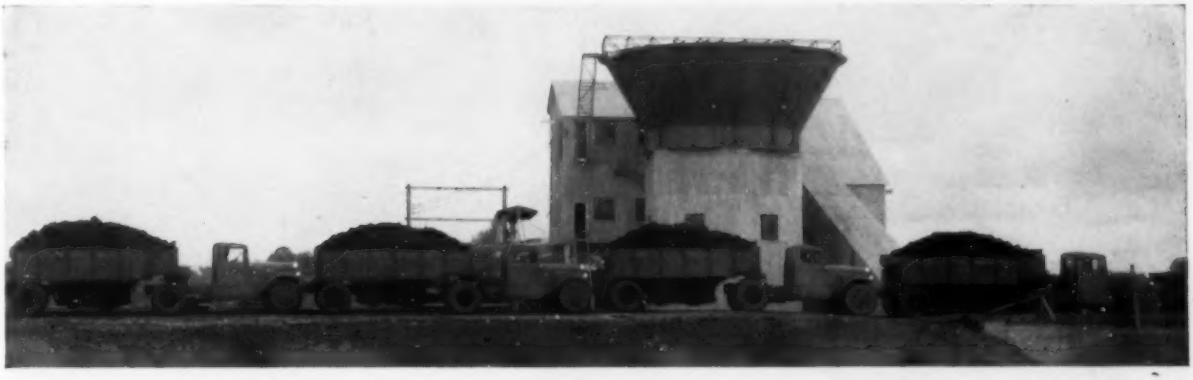
Purple-Strand quality, however, does not end with the premium-price steel. Every step in the making of a Purple-Strand wire rope involves extra skill and attention. For example, design has been perfected until this line is a real precision machine. Lubrication has been studied and special lubricants developed. Every conceivable step has been taken to make Purple-Strand Form-Set the finest wire rope money can buy.

Bethlehem wire rope is available through distributors. Write Bethlehem Steel Company, Bethlehem, Pa., for the names of wire-rope distributors in your vicinity.

BETHLEHEM STEEL COMPANY

IF YOUR PROFITS ARE LOW—

do something about it



START WITH HAULING AND DUMPING COSTS

If you're not using S-D Automatic Bottom-Dumping Trailers . . . if you've never seen them in operation, then, be curious enough to investigate this unusual cost cutting equipment.

In an Illinois mine, the four 16-ton trailers shown above have hauled and dumped twenty-seven hundred tons of coal in a 7 hour period. Are you approaching this efficiency . . . this low production cost?

Glance at the illustration below. Notice how the S-D principle of automatic bottom discharge, so successful for 20 years in rail cars, has now been adapted to S-D Automatic Rubber-Tired Trailers. Doors are tripped automatically as the trailer reaches the hopper or storage bin, then closed automatically as the trailer leaves the bin . . . both operations accomplished solely by the travel of the trailer across the bin . . . no manual labor whatsoever. The operation is as simple as telling about it.

The quickest and easiest way to get rid of a load is to drop the bottom from under it. That is exactly what this trailer does. There are no complicated mechanisms to require attention. Nothing to get out of order. No specially equipped motor truck required. Any truck with sufficient power to pull the trailer will do the job. This is truly a union of simplicity and economy.

S-D Automatic Trailers are cutting hauling and dumping costs for many operators, and they'll do it as well for you. They are built in any size to suit your requirements, from 6 to 50 ton capacities. Let one of our engineers go over the details of this unusual trailer with you . . . let him tell you what they are doing for others and why.

SANFORD-DAY IRON WORKS INC., 707 Dale Ave., Knoxville, Tenn., U. S. A.

MINE CARS, ALL TYPES • TRAILERS • WHEELS • SHEAVES

with BRIDGETON SAND CO., *its* THERMOID HOSE

Here's a unique installation of Thermoid Hose that not only solves a number of problems . . . but that is turning in a typical Thermoid record for high product efficiency and performance.

Through the use of ten connections made of Thermoid Suction Hose, varying in length from 2 feet to 16 feet, the Bridgeton Sand Company of Williamstown Junction, N. J., have made their pipe line completely flexible. This is necessary so that the dredge may be moved to any section of the water . . . and also because of the irregular surface of the ground over which the line runs to the plant. The total length of the line from dredge to plant is 2500 feet, operating under a pumping pressure of 65 pounds per square inch at all times and handling an average of 1000 gallons of sand and water per minute.

Both the Thermoid Suction and Discharge Hose used on this job have been in service for over a year and a half, and in its present condition, it is expected to at least double this service before *any* repairs will be needed.

If you have a hose requirement that takes "sand" . . . or handles sand . . . you may be sure that Thermoid can supply *you* with the *one* hose best suited for the job. Your jobber or Thermoid will be glad to give you specific information on your particular job.

More than half a century of progressive engineering and product development.

THERMOID RUBBER, DIVISION OF THERMOID COMPANY, TRENTON, N. J.

Standard types of belting made by Thermoid:
Transmission Belting
Conveyor Belting
Multiple V Belts
Grader Belting
Canners' Belting
Bucket Elevator Belting

Thermoid

Standard types of hose made by Thermoid:
Air Hose
Water Hose
Steam Hose
Tank Truck Hose
Gasoline Hose
Suction Hose

BELTING HOSE PACKINGS BRAKE LININGS

Over 25 MILLION ATLAS MANASITE DETONATORS

have been used in the brief space of time since their introduction

Another "ATLAS FIRST" *for* GREATER SAFETY

Have men responsible for safety in blasting operations welcomed the new Atlas Manasite Detonators? *Yes!* Purchases of over 25 million detonators answer this question.

Atlas Manasite Detonators make safety precautions more effective by lessening the possibility of accident from inadvertent mishandling.

Through an exclusive method of using hexanitromannite as an initiating compound, Atlas Manasite Detonators offer materially decreased sensitivity to impact and friction—with no loss in detonating efficiency—and no increase in price!

Ask your Atlas Representative for full details.

ATLAS MANASITE

BLASTING CAPS, ELECTRIC BLASTING CAPS, DELAY ELECTRIC BLASTING CAPS

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

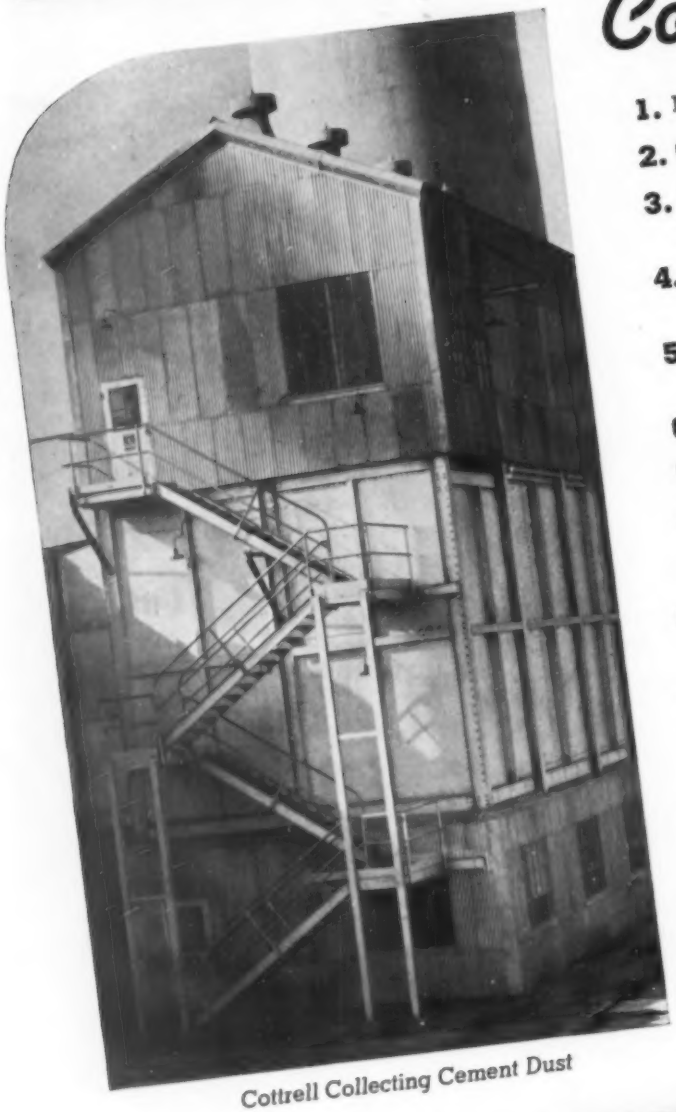
Allentown, Pa.	Houghton, Mich.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Joplin, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Chicago, Ill.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Denver, Colo.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

ONE DAY'S WORK FOR COTTRELLS



Cottrell Collecting Cement Dust

Collecting

1. 120 tons of fly ash at a power plant.
2. 6 tons of soda salts at a paper mill.
3. 55 tons of smelter dust containing 20 percent copper.
4. 13 tons of sodium sulphate at 92 per-cent content.
5. 3 tons of antimony dust from a silver refinery.
6. 208 tons of 12 percent copper dust.
7. 1100 pounds of mercury dust.
8. 10 tons of arsenic.
9. 3 tons of tar at a gas plant.
10. 12,000 pounds of blast furnace dust fine cleaning.
11. 4½ tons of alumina.
12. 5500 pounds of concentrated sulphuric acid.
13. 22 tons of cement dust.
14. 20 tons of roaster dust.

These DAILY savings of values soon pay for Cottrell installations. You can get similar benefits in the collection of any kind of dust, fog, fume or mist or any kind of dust nuisance elimination.

Write for Bulletins

WESTERN PRECIPITATION CORPORATION
1016 W. 9th ST., LOS ANGELES, CALIF.
405 LEXINGTON AVE., NEW YORK, N. Y.

RESEARCH CORPORATION
405 LEXINGTON AVE., NEW YORK, N. Y.
59 E. VAN BUREN ST., CHICAGO, ILL.

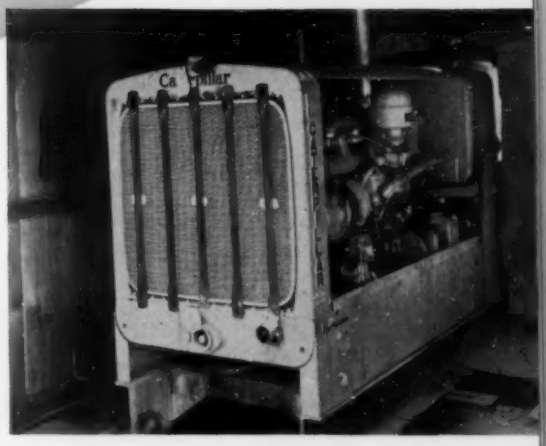
PIONEERS IN DUST AND FUME CONTROL

COSTS GO DOWN

. . . ALL DOWN THE LINE . . . WITH "CATERPILLAR" DIESELS!

• A "Caterpillar" Diesel D7 Tractor owned by the Olympic Portland Cement Co., Ltd., Bellingham, Washington. Hauling lime-rock from the quarry to the crusher-house, it works 8 hours a day — uses only 2 gallons of 7½c fuel an hour. Average haul: 350 feet. Average load: 12 tons!

• Another piece of "Caterpillar" Diesel Equipment, owned by the Olympic Portland Cement Co., Ltd. This 80-horsepower engine drives a 20x24 Traylor jaw crusher — producing 20 tons of crushed quartz per hour, on only 2 gallons of 7½c fuel.



THERE'S not a single one of your operations, from the quarry to the crusher, that you can't do for *less money* . . . with "Caterpillar" Diesel Power!

Savings on fuel alone—for compressor, shovel, hauling and crushing power—*more* than justify investing in this sturdy, dependable equipment!

And it is in those last two qualities—*sturdiness* and *dependability*—that you find even further reason for powering your plant with "Caterpillar" Diesels!

Here are engines sound in design and construction—built to save time by requiring fewer and less-frequent adjustments; to return, for normal care, *thousands* of hours of hard, steady going with a minimum of delay and expense for repairs!

No less economical, dependable and enduring are these engines when they power a "Caterpillar" track-type Tractor. Making a sparing use of low-cost fuel, exerting a tremendous drawbar-pull, running on wear-resisting tracks, and with vital parts protected from grit and dust, "Caterpillar" Diesel Tractors deliver a profit every day—*and keep on delivering it for years!*

No matter how low you've driven your production-costs, your "Caterpillar" dealer can help you *drive them even lower!* See him, or write direct, for your power-specifications.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL POWER

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

THE ABC OF SELLING THROUGH ADVERTISING IS THE

ABC REPORT

The A. B. C. of Circulation:
How Much? Where? How Secured?

NO matter how much advertising you do . . . no matter what group of people you want your advertising message to reach . . . your first question about any publication should be—"Is it an A.B.C. member?"

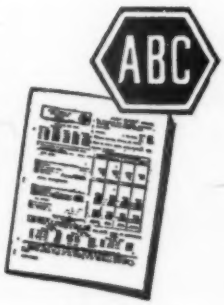
With the A.B.C. report only can you gauge a publication's worth in relation to your sales program.

A.B.C. reports reveal and analyze NET PAID CIRCULATION — the only true measure of advertising value.

A.B.C. reports tell how much circulation there is . . . where it is distributed . . . how it was secured. They give verified information on the quantity, and an important index of the quality of circulation.

Always make the A.B.C. report your first step in buying advertising space. Ask for the A.B.C. report before you spend a penny. It is the only way to make sure you are buying wisely.

If you do not have a copy of our latest A.B.C. report, ask for it now. It gives you the facts about our circulation — facts we want you to know.



Member of A. B. C. and A. B. P.

ROCK PRODUCTS

205 West Wacker Drive, Chicago — 522 Fifth Avenue, New York

A.B.C. — Audit Bureau of Circulations — FACTS as a yardstick of advertising value.

This paper has long been an A.B.C. member because we believe in selling known value.

CENTRAL PENNSYLVANIA QUARRY, STRIPPING and CONSTRUCTION COMPANY, HAZLETON, PA. • •

STARTED TO BUY MARIONS IN 1908 . . . IT HAS BOUGHT 35 TO DATE

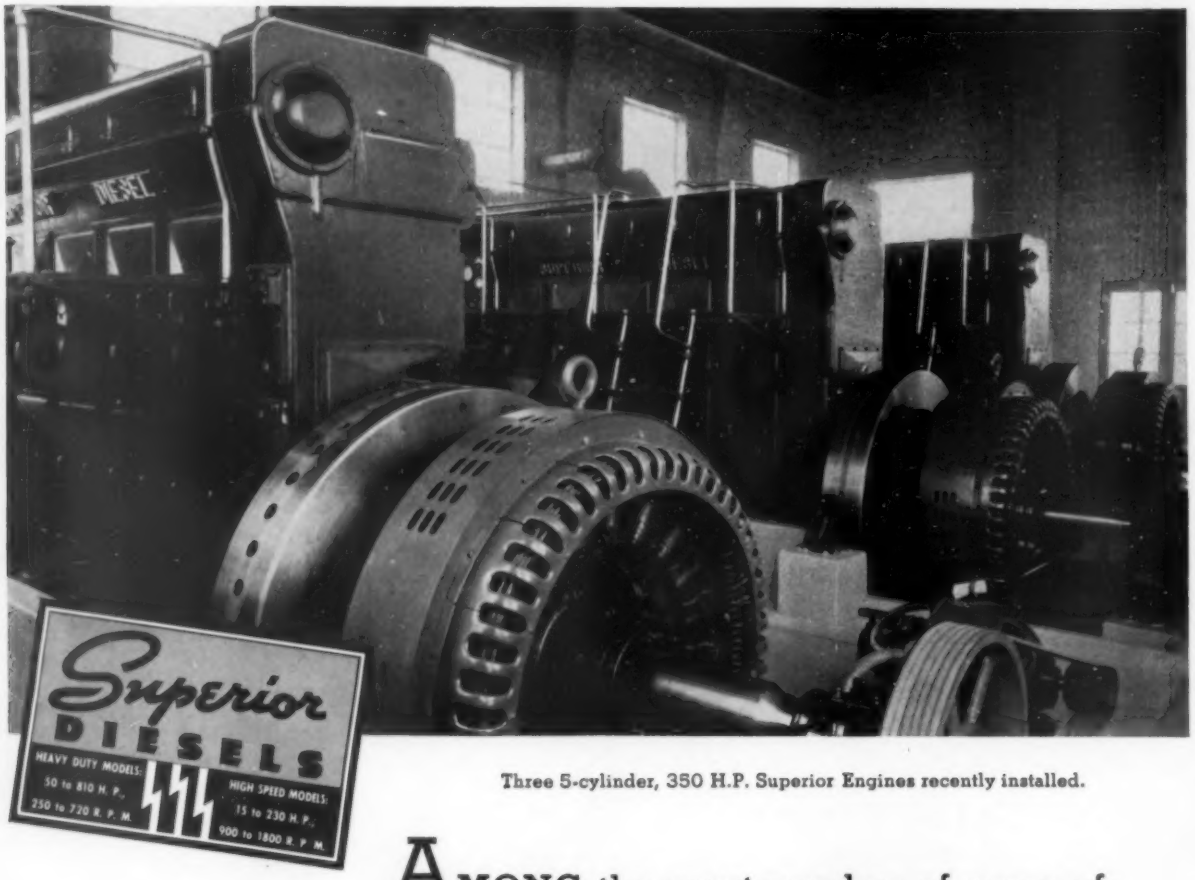
MODERNIZE WITH

MARION

SHOVEL • DRAGLINES CRANES • CLAMSHELLS

Write the MARION STEAM SHOVEL COMPANY, MARION, OHIO, U. S. A., for Bulletins describing the size of Marion you are interested in, and a copy of the latest GROUNDHOG.

FOR LOW COST POWER
3 SUPERIORS at Electra, Texas



Three 5-cylinder, 350 H.P. Superior Engines recently installed.

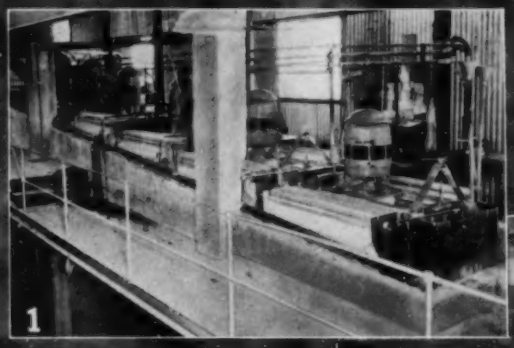
AMONG the great number of users of Superior engines are many who have 3, 4, 5 or more engines in one or more plants, thus testifying to the exceptional value and merit of these modern power units and the careful engineering and honest representation of savings by which they are sold.

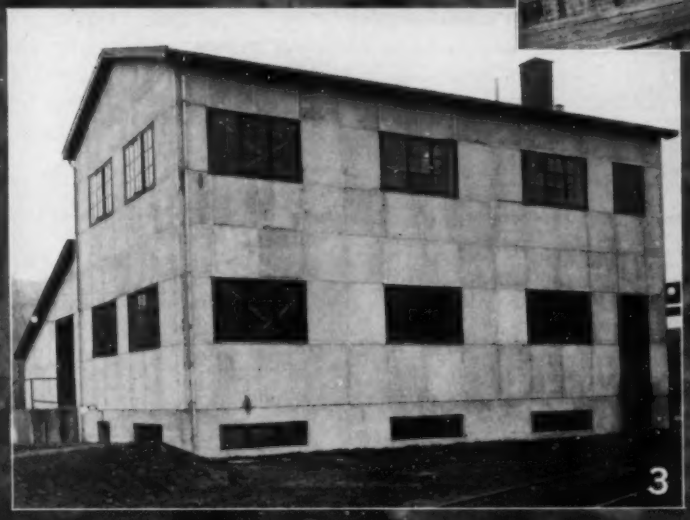
Don't let high power cost call "three strikes" on you without even investigating what Superior Diesels may do! An inquiry does not obligate. Ask for references in your own industry.

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

THE FLOTATION PROCESS in the CEMENT INDUSTRY





has for its object the improvement of inferior cement raw materials by removing the undesired quantities of minerals, making it possible to produce high quality cement from low-grade rock.

Cement raw materials from all parts of the world and of almost every type have been tested in our laboratories to determine process and reagents. Based on continuous tests on a semi-large scale in our pilot plant in Copenhagen, we have designed installations and determined operation costs for the introduction of the flotation process at several works. Of these, two are operating (Finland and South Africa) and another is being erected in South Africa.

For the whole world, with the exception of the United States, Canada and Mexico, we control all patent rights and are supplying machinery for the application of flotation in the cement and allied industries.

Fig. No. 1—Flotation plant, South Africa
Fig. No. 2—Flotation plant, Finland
Fig. No. 3—Flotation Laboratory and Pilot plant, Copenhagen

F. L. SMIDTH & CO. A/S

33, VESTERGADE. COPENHAGEN, DENMARK

All patent rights in North America are controlled by Separation Process Company, Catasauqua, Pa.

The CEMENT *Issue is Coming*

Full of NEWS of the industry throughout the entire world!

Dust—Once a Nuisance Now Profit
Three different types of dust collectors installed in modernized cement plant.

Cement Manufacturers Adopt Scientific Control
Experts discuss modern methods and equipment pertaining to control in the quarry, mill and laboratory.

Increased Capacity and Improved Products Result from Extensive Modernization

Cements—Other than Portland
Discussion of latest developments in the manufacture of masonry and puzzolana cements.

Fuel Selection Determined by Tests
Methods used by cement companies in selecting, testing and buying fuels.

Processing Controlled by Instruments

Producers Save by Using Genuine Repair Parts

All these articles by Eminent Authors
Names known wherever cement is made and used—P. H. Bates, W. C. Hanna, L. A. Wagner, and others equally well known.

SPECIAL ADDED FEATURE
Colored insert reproducing all cement companies' trade marks.

- * *Colored insert stock available without extra charge*
- * *Make your reservations NOW*
- * *Forms close July 20*
- * *Issued August 1*

ALL THIS EDITORIAL MATERIAL PERFECTLY TIMED TO AUGMENT YOUR ADVERTISING MESSAGE

DONT MISS THE AUGUST ISSUE OF

★ **ROCK PRODUCTS**

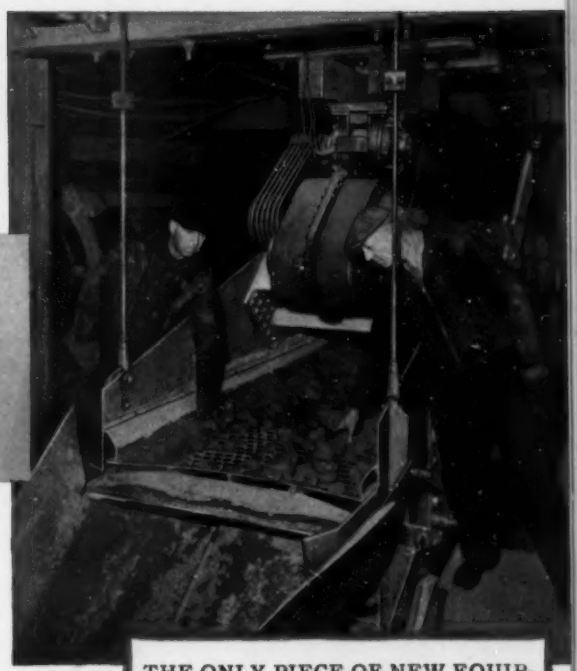
205 WEST WACKER DRIVE CHICAGO, ILLINOIS

The Industry's Recognized Authority

OPERATING COSTS CUT $17,500 PER YEAR!

Another true case history from the Allis-Chalmers files that proves **"IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF!"**

Koenig Coal & Supply Co. Doubles Output . . . Cuts Costs of Production in Half! Find Out How You Can Save Money by Modernizing with the Allis-Chalmers System . . . with the Equipment that Pays for Itself!



THE ONLY PIECE OF NEW EQUIPment the Koenig Coal & Supply Co. needed to cut the cost of gravel in half was this Allis-Chalmers Low-Head Screen . . . the fastest selling screen on the market today.

When the flow sheet has to be changed to meet today's demand for finer aggregates . . . when large boulders crop up in the gravel bed . . . when power and maintenance costs start to soar . . . that's when a crushing plant needs real engineering skill to keep operating at a profit!

That's what John F. Koenig, president of the Koenig Coal & Supply Co., Detroit, was up against early in 1937. Production was dropping off. Four or five men had to be stationed at the crushers to work large boulders around so that feed could be increased. It looked as if a big investment in new equipment was needed. Then Mr. Koenig called in the Allis-Chalmers engineers!

These engineers licked the problem! They stepped up the plant capacity to 244.6 tons per hour . . . nearly double the former output for the 1200 annual hours of operation. They cut the cost of gravel from 12 cents to 6 cents per ton . . . a total saving of $17,500 for the year 1938!

Profit by Modernizing!

And that saving was effected . . . not with new equipment that would have meant thousands of dollars to Allis-Chalmers . . . but largely through modernizing the existing machines! The crushers were set closer, speeded up, and the throw increased. The old rotary screen was replaced with an Allis-Chalmers Low Head Vibrating Screen to insure lower carryover to the crushers.

No wonder the Koenig Coal & Supply Co. recently bought an Allis-Chalmers tractor and scraper. They wanted the great engineering . . . the full measure construction that goes into all Allis-Chalmers equipment!

You'll want to know how Allis-Chalmers 90 years of engineering superiority can go to work for you! Let a trained engineer in the district office near you show you how you can cut operating costs . . . keep production rolling . . . with the equipment that pays for itself!

1086

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

CRUSHING · CEMENT AND MINING DIVISION

ALLIS-CHALMERS

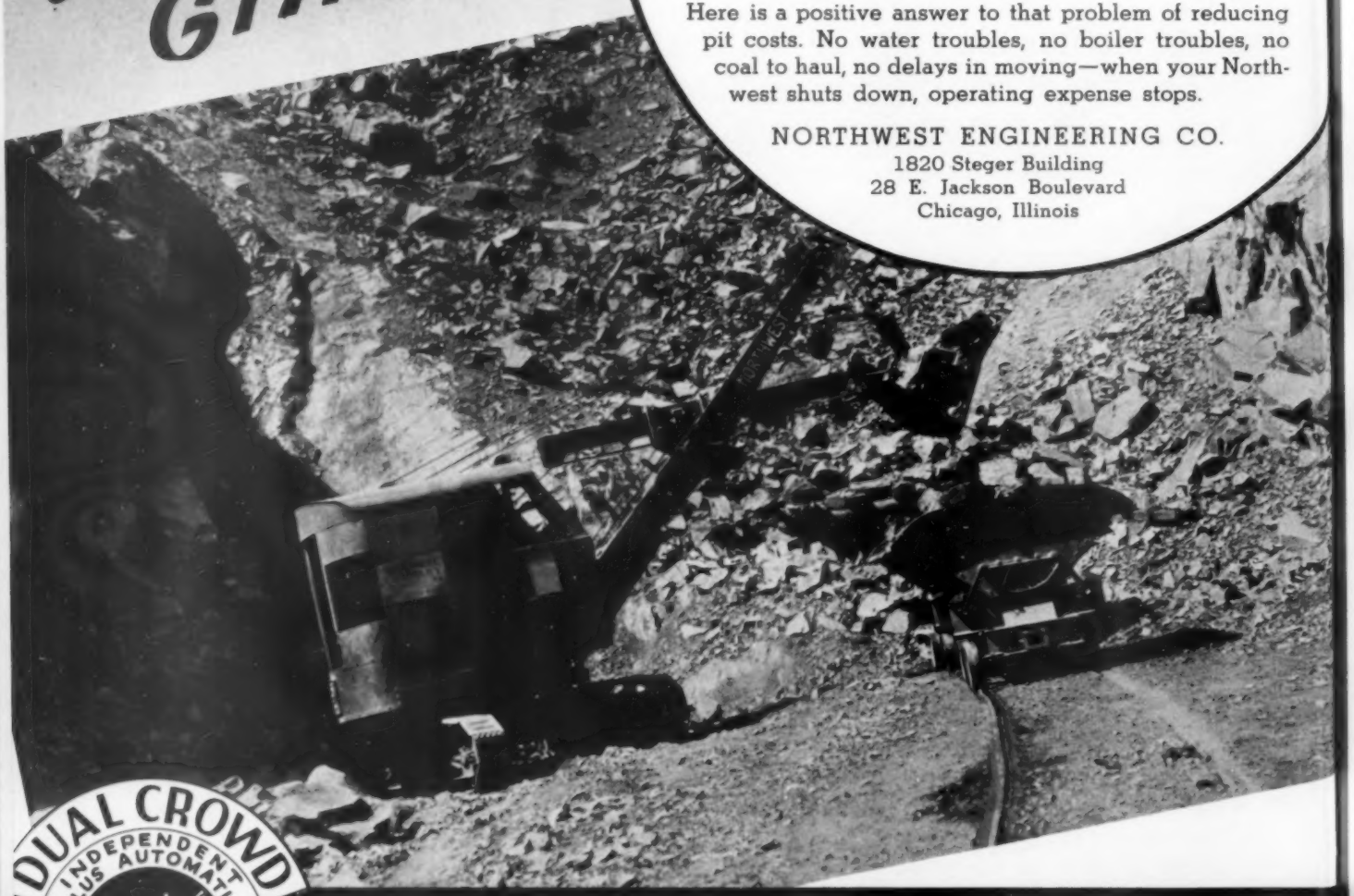
MILWAUKEE · WISCONSIN

A Smaller NORTHWEST will do the work of many an old time GIANT!

TIMES change—and so does machinery. You fellows who are still using shovels 25 years old (don't smile—there are lots of them still in service) may not realize the possibilities for lower cost pit operations that are embodied in the smaller Northwests. They'll do the work of many an old time giant. These machines are rugged—cast steel bases with cast steel side frames assure the maintenance of shaft alignment and takes the shocks of rock digging. The Northwest Dual Crowd, automatic *plus* independent, assures a digging force that other shovels waste. Fast swing and easy mobility save time. The "feather-touch" control makes possible easy operation and the Cushion Clutch reduces the stresses and strains on every part under power—and these are only a few features that make Northwests real rock shovels.

Here is a positive answer to that problem of reducing pit costs. No water troubles, no boiler troubles, no coal to haul, no delays in moving—when your Northwest shuts down, operating expense stops.

NORTHWEST ENGINEERING CO.
1820 Steger Building
28 E. Jackson Boulevard
Chicago, Illinois



DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus

NORTHWEST

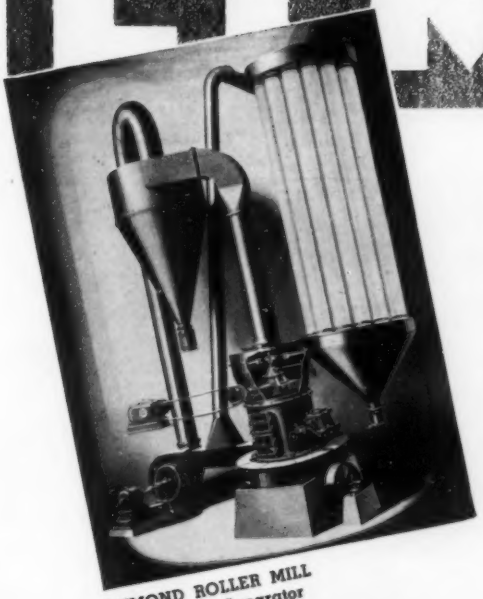
Shovels • Cranes • Draglines • Pullshovels • Skimmers

LIME PRODUCTS *Any Fineness to*

99.5% THROUGH 400-MESH

Lower Your Costs with..... RAYMOND EQUIPMENT

Economy and quality demand the use of modern methods in the manufacture of lime products . . . and Raymond engineers offer the following suggestions, based upon specialized experience in this field:



RAYMOND ROLLER MILL with Whizzer Separator

LIMESTONE and QUICKLIME . . . . .

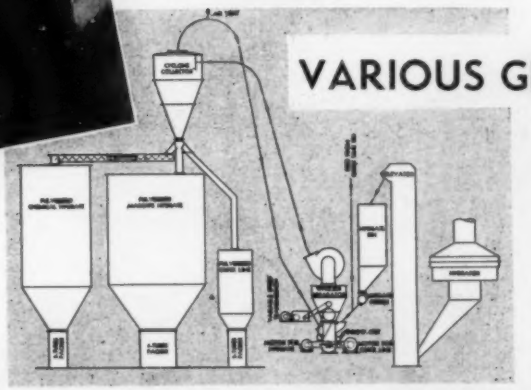
In handling large capacities where power consumption is a major factor, there is no combination of machines equal to the single Raymond unit, shown at left. This whizzer-equipped Roller Mill pulverizes, classifies and conveys the product in an enclosed dustless system to storage by one continuous, automatic operation.

The power cost per ton in grinding quicklime is extremely low, and any grade can be readily produced, from 50 to 200 mesh material, simply by changing the speed of the whizzer while the mill is running. This mill is equally efficient in grinding limestone to uniform fineness, as in making fillers or fertilizers.

AUTOMATIC PULVERIZER with Whizzer Separator

SEPARATING HYDRATED LIME.....

Maximum specifications for high purity hydrated lime can be obtained economically with the Raymond Automatic Pulverizer and whizzer type separator, equipped with the throw-out attachment. It takes the lime from the hydrate bin, disintegrates and classifies the material, while rejecting impurities by the throw-out device. This modern unit produces any fineness, from agricultural lime up to superfine chemical hydrate, testing 99.5% passing 400-mesh . . . and without loss of good hydrate.



VARIOUS GRADES of LIME . .

The diagram shows a practical set-up for a plant, making either pulverized quicklime, or mason's finishing lime and chemical hydrate. One Raymond Automatic Pulverizer with whizzer separator does the job.

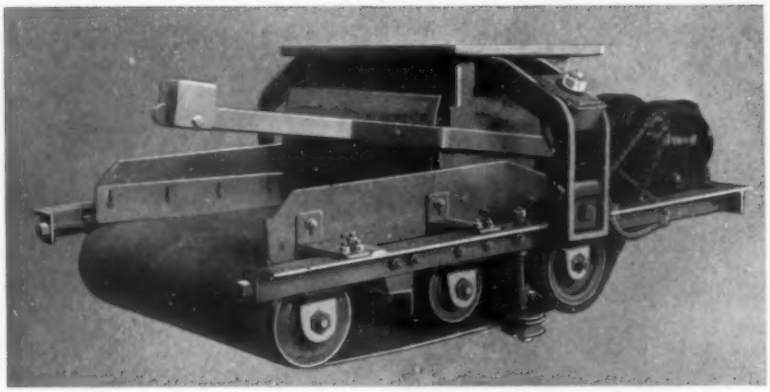
Raymond also builds the new double whizzer type of Mechanical Air Separator for separating lime direct from the hydrator . . . and the famous Bowl Mill for direct-firing rotary lime kilns.

If your problem is lime production . . . write to Raymond for information.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

HARDINGE

CONSTANT WEIGHT FEEDER



the Cost Killer!

What *Others* Have Said

"SINCE the introduction of this feeder, the capacity of the Ball Mill is increased about 20%."

"If we had known as much about Constant Weight Feeders when we built our mill as we do now, all feeders would have been of the Constant Weight Type."

"Since the installation was made, it has been possible to reduce the operating labor by one man per shift."

"This feeder has been very satisfactory . . . requires little or no attention—it is very sensitive and, therefore, accurate and upkeep is practically nil."

Investigate this Profit-Making Feeder. Get full data. Write for Bulletins 33-C and 41.

Hardinge Sets the Pace

HARDINGE

COMPANY, INCORPORATED – YORK, PENNSYLVANIA

New York, 122 East 42nd Street Chicago, 205 West Wacker Drive San Francisco, 501 Howard Street Denver, 817 Seventeenth Street

CONICAL MILLS

COUNTER CURRENT CLASSIFIERS

THICKENERS CLARIFIERS

RUGGLES-COLES DRYERS

CONSTANT WEIGHT FEEDERS

TUBE ROD AND BATCH MILLS

Independent CHAIN CROWD

NOW AVAILABLE ON IMPROVED 3/4 YD. LORAIN-40A

• Here's independent power application to—and independent control of—crowding, hoisting, retracting... Crowd the dipper deep into the bank, when and how you want to, to rip through the toughest going! Ram the dipper right out beyond and above the boom point for high lift digging or hold it there to load trucks on top... You can do any of these singly, whenever needed... or you can combine crowding, as required, with high-speed powerful hoisting to obtain the smooth, fast, powerful digging cycles that enable the ¾-yd. Lorain-40A to

"MOVE MORE MATERIAL, FASTER, AT LOWER COST."

Write today for a catalog describing this newest of the Lorain-40A's many money-making features . . plus its many other up-to-the-minute improvements.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

THEW CENTER DRIVE
REG U.S. PAT. OFF.

TAKE YOUR CHOICE

The ¾-yd. Lorain-40A is also available with the Standard Rope Crowd—a simplified, dependable, all-cable crowding mechanism which has proved its speed and efficiency on hundreds of jobs in all kinds of digging

CUTTING

The Primary Purpose of All Barber-Greenes

Barber-Greene Bucket Loaders load trucks with less power, less investment, less time, cheaper labor, and less total cost than any other method. B-G Loaders have 12 months a year of usefulness, doing all types of loading, unloading cars, stripping light excavating, and screening if desired.

Barber-Greene Belt Conveyors offer by far the cheapest, most flexible, simplest method of unloading, stocking, moving bulk materials. Their standardized sectional construction gives unequaled original delivery, erection and change of set-up.

It is these facts that make Barber-Greene pre-eminent in Cost Cutting Material Handling. For full information, phone, wire or write Barber-Greene Company, 459 West Park Avenue, Aurora, Illinois.

38-6

COSTS

STANDARDIZED MATERIAL HANDLING MACHINES

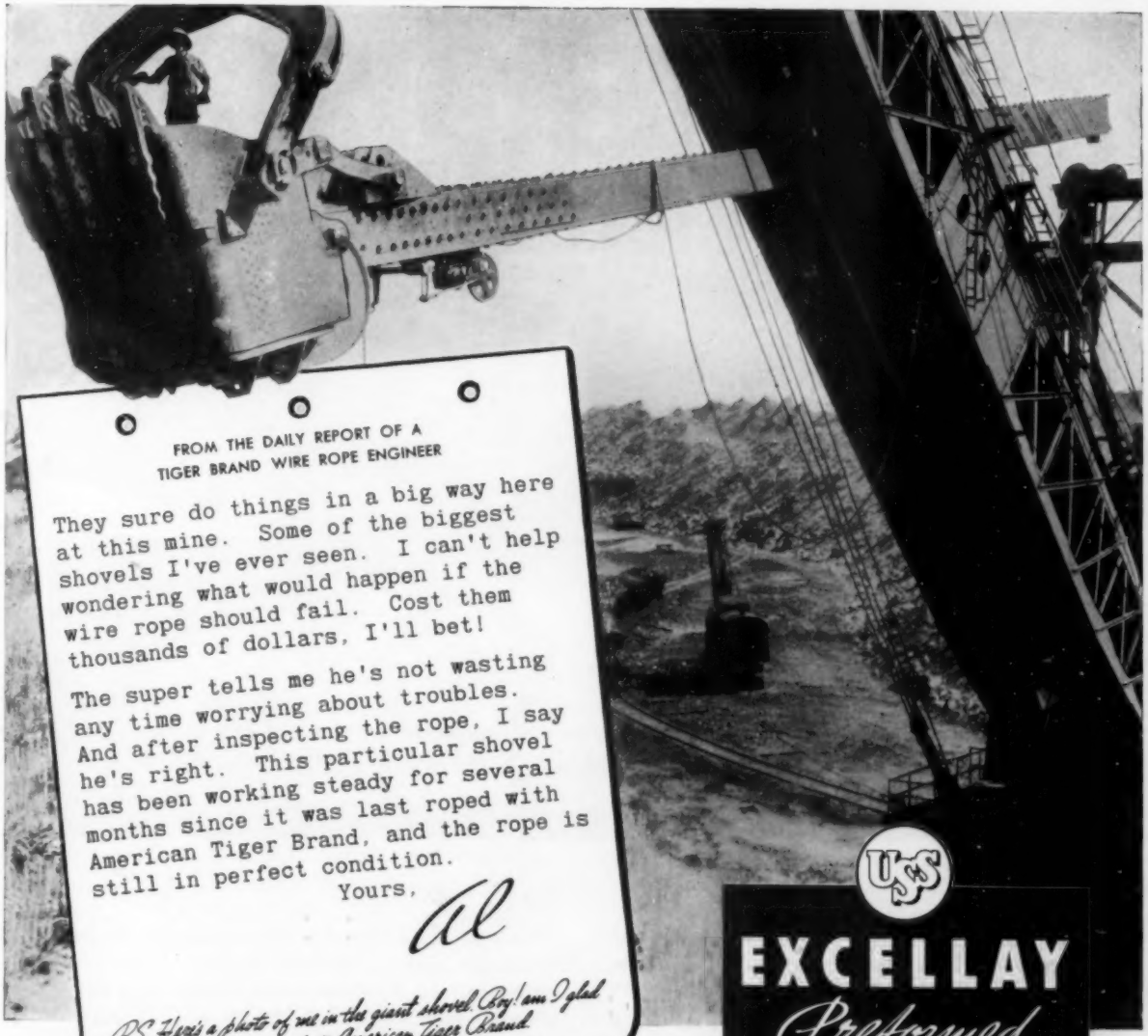
Representatives in Principal Cities

BARBER GREENE

BRANCH OFFICES
Cleveland · Chicago · New York
Columbus · Boston · Detroit
Cable Address · BARGREENE

Standardized Belt Conveyors
CARRIERS
Portable CONVEYORS
Permanent CONVEYORS
and other standardized unit parts
SNOW LOADERS for high speed removal
MIXERS for Bituminous or Stabilized Mixing · · · Central or Travel Plant
Leveling-Tamping FINISHERS
LOADERS for lowest cost loading
Vertical Boom DITCHERS
Low Cost-High Quality Road Construction

. . . ROPE STILL IN PERFECT CONDITION



FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

They sure do things in a big way here at this mine. Some of the biggest shovels I've ever seen. I can't help wondering what would happen if the wire rope should fail. Cost them thousands of dollars, I'll bet!

The super tells me he's not wasting any time worrying about troubles. And after inspecting the rope, I say he's right. This particular shovel has been working steady for several months since it was last roped with American Tiger Brand, and the rope is still in perfect condition.

Yours,

Al

P.S. Here's a photo of me in the giant shovel. Boy! am I glad the rope holding me up is American Tiger Brand.

EXCELLAY *Preformed* **WIRE ROPE**

TURN your wire rope questions over to an American Tiger Brand Wire Rope Engineer. He lives and breathes wire rope, spends most of his time seeing it in action, checking its performance, studying ways and means of saving you money.

These engineers know what they are talking about, because they spend most of their time right out where the rope is used. They know what punishment it has to stand and how to stretch your wire rope dollar. Since American Tiger Brand Wire Rope is made in all constructions and grades, our engineers can help you specify the type that is best suited for your purpose. Ask one of these men to call, or write for data.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

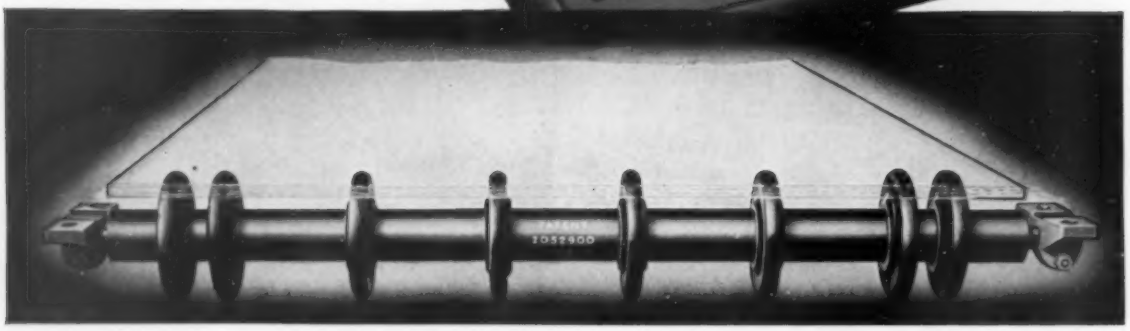
VISIT THE UNITED STATES STEEL BUILDING
NEW YORK WORLD'S FAIR · 1939

UNITED STATES STEEL

RUBBERDISC
RETURN IDLER

FOR BELT CONVEYORS

NO LUBRICATION
LESS POWER
SELF CLEANING
RESISTS ABRASION



THE RUBBERDISC Return Idler is ideal for use on conveyor belts handling abrasive, corrosive, damp, or somewhat sticky material.

It is constructed of a steel tube shaft on which is mounted a series of resilient rubber discs spaced as shown in the picture.

Within the steel tube are ball bearings completely sealed and lubricated for life. No greasing or oiling is required.

Due to the light weight of the idler and the type of bearings used it turns very easily. Slippage is thus avoided and the conveyor operates with a minimum of power.

The resilient and flexible discs and the open construction, with the belt supported at only a few points instead of its full width, makes this a self-cleaning idler. The slight flexing of the belt and the rubber discs also has an effective cleaning action on the belt. Conveyed material cannot build up on this idler.

Abrasion of both belt and idler is greatly reduced because there is much less wear in a rubber-to-rubber contact than in rubber-to-metal.

The answer to your problem of return idler maintenance, and dirty belts, is the ROBINS RUBBERDISC IDLER.

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ROCK PRODUCTS

We Need Highways and Railways

About a year ago we had the temerity to defend a United States Senate bill to create a transcontinental system of superhighways. We defended the scheme not because projected tolls might pay for construction, but because the public was then spending several times the cost on various W.P.A. and P.W.A. projects of very limited utility to the great mass of the people. Congress did pass a joint resolution directing the Bureau of Public Roads to make a report. Fortunately, the Bureau is an engineering organization and not a political one; so its report is honest, praiseworthy and constructive.

The idea of a transcontinental toll-road system is condemned as a means of recovering the cost of construction and maintenance, although according to estimates it is far nearer self-liquidating than many New Deal projects that have been loaded on the people. In lieu of toll roads the Bureau has outlined a master system of transcontinental highways, which when fully developed will be a system of superhighways. Moreover, the Bureau has suggested a plan by which the government, or the public, can largely recover the cost of constructing such a system.

The plan suggested is for the Federal Government to take excess land by condemnation and recover some or all of the cost of the improvement from the increase in value of the excess land expropriated.

It is to be hoped that because the President is in favor of it will not react to the disadvantage of the proposal. It will be said, of course, that the President is in favor of any move that will increase the power of the Federal Government. It will be said he is turning farther "to the left"—becoming more of a socialist—because he wants the public to get the benefit of the "unearned increment."

We need the highway improvements recommended by the Bureau of Public Roads, and we need them now, as every one who has traveled extensively on our highways knows. Without such a method of paying for them, the principal improvements needed—belt lines outside and inside cities—would be a practical impossibility. Yet doing it this way means surrender of more state and local rights of self-government, upon which our scheme of national government is founded.

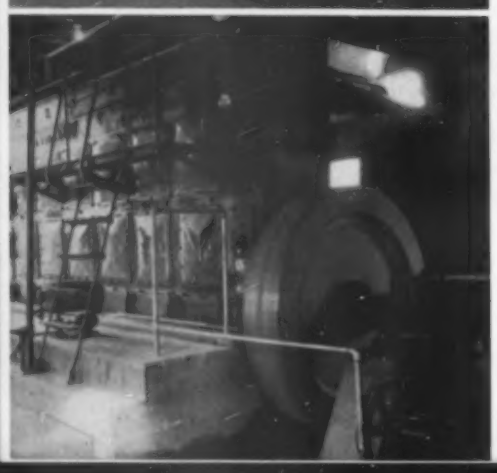
Probably the chief reason the Bureau of Public Roads recommends a Federal Land Authority is because it has found by experience in dealing with state, county and municipal politicians that if left to them the job would never be honestly, efficiently or expeditiously accomplished.

A bad part of the picture is that the Bureau of Public Roads is in great danger of losing its present independent position by being lumped with W.P.A. and P.W.A. in the new government reorganization ordered by the President. Federal-aid highway work supervised by the Bureau of Public Roads has been honestly and competently performed for many years. Mixing W.P.A. and relief work with this agency could either increase the efficiency of W.P.A. or destroy the efficiency and integrity of the Bureau of Public Roads. W.P.A. has become a vast, odious political machine, and it is to be hoped that it will not be allowed to contaminate the Bureau.

The Bureau of Public Roads' report comes at an opportune time, for Congress has before it several proposed acts for "railroad relief." In preparation for this probable legislation, both the railway managements and the makers and users of motor trucks and buses have employed distinguished experts. The railways would add to the financial burden of those who use the highways for profit, while the latter contend that such use of the highways is merely incidental. There is some truth, probably, on both sides. It is something capable of engineering analysis; and the Wheeler-Truman omnibus transportation bill (S. 2009), which has a fair chance of being enacted, provides among other things for an investigating board of three, to be appointed by the President for a 2-year period, which shall look into the various modes of transportation to determine the relative economy and fitness of each for particular classes of service, and also to determine the existence of any governmental subsidies. That is fair enough and something that should have been done long ago. Obviously, we need both highways and railways.

With all our boasted American resources and efficiency it does not seem right that any industry should depend on government subsidies for existence. Nor does it appear that the present maladjustment ever will be permanently cured by artificial restrictions of one kind or another. When we start amending the natural laws of economics we inevitably end in such a jam as the administration finds itself in today—with eleven million bales of cotton in storage and American textile manufacturers importing cotton or closing their plants. Gradually we are learning by experience that any kind of artificial price-fixing or rate-making entails price-fixing and unified control of *everything*—which Heaven forbid!

Nathan C. Rockwood



Three Plants In One Thirteen Different Crushed

With a production of 2000 tons of crushed stone in a 10-hr. day in as many as 13 sizes, the plant of Narehood Bros., Milton, Penn., presents some unusual features. It has no rail facilities, but depends upon seven Ford trucks with Thornton tandem drives and 28 Diamond T trucks to haul stone products to points radiating 75 or more miles from the plant. The Ford trucks have ten wheels and haul as much as 10 tons to the load. To complete its independence as a self-contained unit, the plant produces all its power with a 575-hp. National-Superior engine.

Sam Narehood and Foster Narehood, former contractors, started with a plant having a 300-ton daily capacity and by successive stages increased production until in 1933, capacity reached the present figure. Washing facilities were added in 1936 and more recently the capacity for smaller products was increased to meet newer demands.

Produce Thirteen Sizes

To get rid of dirt, in the original plant, 1-in. minus stone was wasted before the second stage of reduction. All Pennsylvania specifications, from 4- to ⅛-in. sizes, are now being met without re-setting of the crushers; and frequently as many as 13 distinct products are made simultaneously.

Equipment comprises a primary crushing unit, a secondary crushing unit with provisions to pass or by-pass any amount of the product to the washing plant (the remainder to be sized unwashed). At a second washing plant stone reclaimed from the dry plant bins is screened after further reduction or by-passing the crushing unit.

In blasting, well drill holes are driven to the depth of the 140-ft. face. Trucks are loaded by a Marion 1¼-cu. yd. steam shovel and a Bucyrus-Erie 1⅞-cu. yd. gasoline-driven shovel. A 30-in. gyratory crusher is fed quarry run stone over a 5-ft. 8-in. x 6-ft. reciprocating feeder, and discharges 5-in. to 6-in. minus stone to a 36-in. belt conveyor.

The conveyor belt carries the primary crusher product to a secondary crushing building where it is put over a 5- x 8-ft. double-deck mechanical vibrating screen, where a split is made to divert part of the stone to a wet screening plant and the remainder to a dry

Fig. 1: Traylor primary crusher, fed by a McLanahan & Stone reciprocating feeder, reduces stone to 4 to 4½-in. Fig. 2: One of the Niagara vibrating screens for sizing unwashed stone. Note chutes for flexibility. Fig. 3: Stone from dry storage bins is reclaimed over belt conveyor to be passed through or by-passed a reduction crusher and put through a new washing plant. Fig. 4: National-Superior Diesel engine of 575-hp. handles the full plant load. Fig. 5: Overall view of plant. On right is the new washing plant built in 1938. A truck may be seen dumping into the primary crusher. This building also houses the dry screening plant. On extreme left is the secondary crushing unit

Produce Stone Sizes

By BROR NORDBERG

plant. Minus 1½-in. throughs from the lower deck are washed and sized into commercial stone. Plus 3½-in. stone passing over the top screen deck drops into a 4-ft. cone secondary crusher; and the 1½- to 3½-in. intermediate product either by-passes the crusher to the dry screening plant in producing ballast or is put through the crusher to produce stone chips and other commercial sizes.

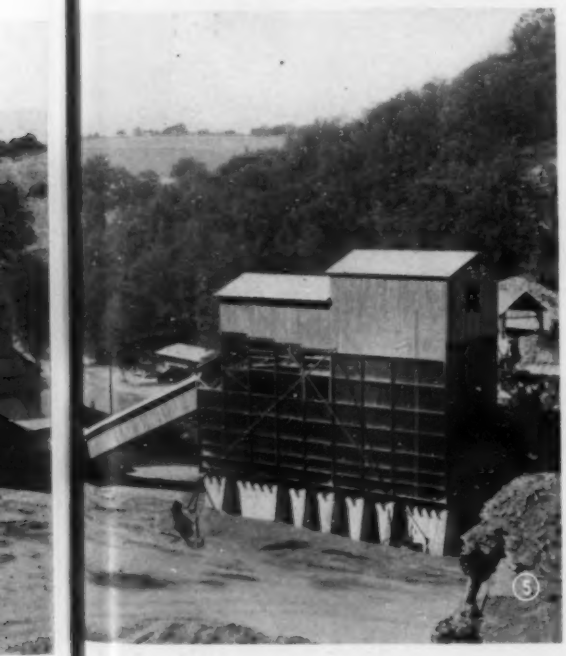
Products to be dry-screened are carried by belt conveyor to two 4- x 12-ft. triple-deck vibrating screens where the screens are split to produce 3/16 to 5/8-in. (binder); 100 percent minus 3/16-in.; 100 percent minus 5/8-in. or other desired sizes.

Sized, unwashed stone products are dropped into five bins having 800 tons total capacity and the oversize is returned through chutes on to the belt conveyor, taking stone from the primary crusher, which is closed-circuited with the secondary crusher. Stone to be wet-screened is carried by an independent belt conveyor from the secondary crusher and discharged into a 25-ft. twin log washer to scour clay and other impurities from the stone and to break down any soft stone particles. About 300 g.p.m of water is added in the log washer, with the overflow going into a sump and the discharge to a 4- x 12-ft. triple-deck vibrating screen. This screen has 1¼-in. openings on the top deck, 1-in. on the intermediate deck and is split with ¼- and ½-in. openings on the lower deck to produce a ¼- ⅝-in. stone as well as fines. Capacity in this plant is 1000 tons of stone in five bins.

Two Washing Plants

In 1938, an entirely independent washing plant was built to wash stone reclaimed from the dry stone bins direct, or after passage through a 3-ft. fine bowl cone crusher. Bin gates are opened to release stone from any bin to a belt conveyor with a self-cleaning tail pulley which can either discharge the stone into the cone crusher or by-pass it to the washing plant.

The belt discharges to a 4- x 16-ft., double-deck, horizontal screen with ⅛-in. openings on the top deck and the lower deck is divided with 10-mesh and 20-mesh openings. Plus ⅛-in. stone is put through a 25-ft. twin log washer and the intermediate product is sometimes similarly handled. The log washer discharge is passed over a 4- x 12-ft. triple-deck screen for sizing. This third plant has a bin capacity of 1600 tons for all sizes. Products are ballast, various sizes of commercial stone, asphalt filler, two grades of agricultural limestone, and amiesite top stone (3/16- to ⅜-in.); numbering 13 in all. By having plenty of screen cloth surface and dividing some of the decks into two sections with different openings, special products with a lower size limit



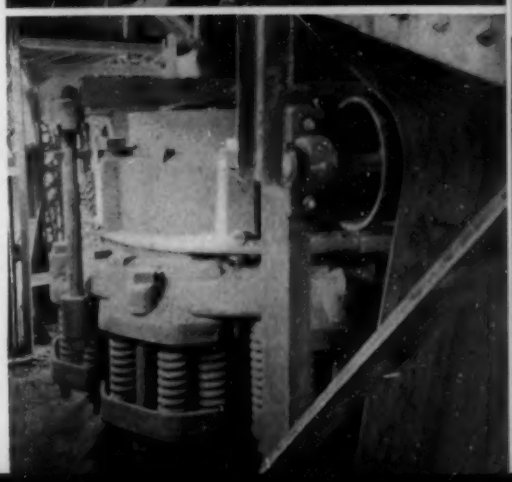


Fig. 5: One of the Ford trucks equipped with four-wheel drives used in hauling loads as high as 10 ton for 75 miles. Fig. 7: One of the 25 ft. long McLanahan & Stone twin log washers. Fig. 8: Stone from the dry storage bins is carried by belt conveyor and passed over the Nordberg horizontal screen in the background. Material from this screen is scrubbed in the log washer, to the left. Fig. 9: Nordberg reduction crusher

closely approaching the upper size limit are produced simultaneously with the sizing of more common stone sizes.

Washing of stone is not required by Pennsylvania's specifications, but washing equipment was installed voluntarily in order to produce cleaner stone. Log washers effectively remove the occasional discolored stone by breaking down surface deposition.

The plant is electrified with individual motor drives throughout and the power is developed by the Diesel engine at a cost of less than 2c per ton. The connected motor horsepower driving each unit of equipment follows:

Unit	Motor	Drive
Primary crusher feeder	10 hp.	v-belt
Primary crusher	125 hp.	v-belt
Belt conveyor to secondary crusher (No. 3)	20 hp.	gear reducer
Screen No. 4	10 hp.	v-belt
Belt conveyor No. 10	15 hp.	gear reducer
Screens No. 11	10 hp.(2)	v-belt
Belt conveyor No. 6	15 hp.	v-belt
Log Washers	60 hp.(2)	gear
Screen No. 8	10 hp.	v-belt
Three inch water pump	20 hp.	direct-connected
Reduction crusher No. 14	60 hp.	v-belt
Belt conveyor No. 13	15 hp.	v-belt
Horizontal screen No. 15	10 hp.	v-belt
Screen No. 17	10 hp.	v-belt
Water pump	20 hp.	direct-connected
Secondary crusher	100 hp.	v-belt
Engine house compressor	7½ hp.	v-belt
Diesel engine water pump	1 hp.	v-belt

LEGEND

1—McLanahan & Stone 5 ft. 8 in. by 6 ft. reciprocating feeder
2—Traylor 30-in. gyratory crusher
3—Belt conveyor (36-in.) on 132-ft. centers
4—Niagara 5- x 8-ft. double-deck screen
5—Symons 4-ft. cone crusher
6—Robins 24-in. belt conveyor on 128-ft. centers
7—McLanahan & Stone twin log washer (25-ft. length)
8—Niagara 4- x 12-ft. triple-deck screen
9—Bins (400 tons) for storage washed stone
10—Sprout-Waldron 30-in. belt conveyor on 130-ft. centers
11—Two 4- x 12-ft. Niagara triple-deck screens
12—Storage bins (800 tons) for unwashed stone
13—Sprout-Waldron 20-in. belt conveyor on 166-ft. centers (self-cleaning tail pulley)
14—Symons 3-ft. fine bowl cone crusher which can be by-passed
15—Symons 4- x 16-ft. double-deck screen
16—McLanahan & Stone twin log washer (25-ft. length)
17—Niagara 4- x 12-ft. triple-deck vibrating screen
18—Storage bins (1600 tons) for washed stone

Constitutionality of Wages And Hours Law?

The ambiguity of the Federal Wages and Hours Law is obvious, and employers will not know for years whether certain practices are violations or not —that is if the law remains on the books. The administrator may rule, but the courts must decide. So far there has been no real constitutional test.

There have been convictions in the federal courts, but these have had to do with minimum wages rather than limited hours of work. In South Carolina, a state wage and hour law has recently been held unconstitutional by the state's supreme court. This case is of especial interest because the courts have generally held that the *police powers* of the state are broader than those of the federal government.

According to George P. Ellis, in the *Illinois Journal of Commerce*, the case here decided is that of *Gasque, Inc.* (and a group of drug stores), Respondents *v. John W. Nates*, Commissioner of Labor of the State of South Carolina.[1] The supreme court sustained the findings of the lower court in every particular. The analysis of the issues is, therefore, that of Judge G. Duncan Bellinger of the lower court.

The South Carolina Act regulating wages and hours limited the workweek in manufacturing and mercantile establishments, enumerated in the Act to 56 hours, and the work-day to 12 hours. Certain types of establishments were exempt.

The chief constitutional questions raised were:

(1) Does the Act deprive the plaintiffs of their property without due process of law?

(2) Does the Act deny to them the equal protection of the law in violation of the State and Federal Constitutions?

(3) Does the Act impair the rights of the plaintiffs under the privileges and immunities class of the Federal Constitution?

(4) Does the Act impair the obligation of existing contracts in violation of the State and the Federal Constitutions?

(5) Do the exemptions constitute illegal discrimination amounting to impairment of the plaintiff's constitutional rights?

(6) Do the provisions of the Act illegally delegate to the Commissioner of Labor certain legislative and judicial functions in violation of the separation of powers provisions of the State and Federal Constitutions?

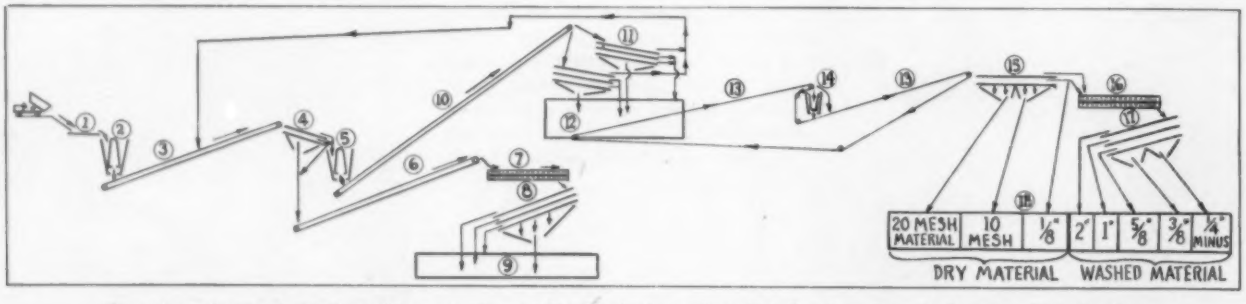
Judge Bellinger declared the South Carolina Act unconstitutional and void for violating the due process, equal protection and contract clauses of both State and Federal Constitutions. In so ruling, he cited the precedent laid down in *Adair* v. *United States* (208 U. S. 161):

> The right of a person to sell his labor upon such terms as he deems proper is in its essence, the same as the right of the purchaser of labor to prescribe the conditions upon which he will accept such labor from the person offering to sell. * * * In all such particulars the employer and the employee have equality of right and any legislation that disturbs that equality is an arbitrary interference with the liberty of contract which no government can legally justify in a free land.

and continued:

> This constitutional guaranty of liberty of contract cannot, of course, be regarded as absolute in the sense that there can be no State regulation of matters as to which persons might desire to contract. There remains the State's police power which permits the Legislature to enact laws for the general good of the citizens of the State even though the incidental effect of regulation thereunder would be to deprive some individual of liberty or property. When this police power is properly exercised the deprivation of life, liberty or property is with due process of law. Similar principles apply to the constitutional prohibition against impairment of the obligation of a contract.
>
> To be valid as a legislative exercise of police power, the legislation must be clearly demanded for the public safety, health, peace, morals or general welfare.

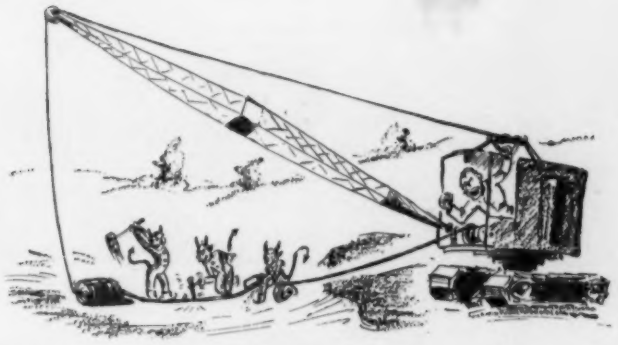
[1] Case No. 1682, Opinion 14839, filed March 14, 1939.



Flow sheet of screening and washing operations at Narehood Bros. plant. Details of equipment shown in legend, above

A Clinic
On Operating Problems

1—Wire Rope Life and Service



The editors propose to use this page in each issue of ROCK PRODUCTS to answer questions on operating problems submitted by readers. In answering these questions, names or places will not be given. The editors will seek the best information obtainable from all sources and invite readers to send in questions.

QUESTION this month is: Why does my wire rope give such limited service?

CASE: Sand and gravel plant using a 1¼-cu. yd. Byers "Master" dragline; ⅞-in. dragline wire rope, 50-ft. lengths, originally lasted only 3 days; by correcting improper winding on drum, life was increased to 12 days. No lubrication except anti-rust because it has been found that grease holds abrasive dust and sand and has harmful effects. Using preformed rope exclusively because it is easier to install, doesn't flare out and lasts longer. Trying various makes.

ANSWER: The place to go for the answer is of course to the experts on wire rope employed by the larger wire-rope manufacturers. The manuals or pocket books on wire rope, such as just published by the Broderick & Bascom Rope Co., and A. Leschen & Sons Rope Co., will prove very helpful.

The first point that needs elaboration is this: What is the normal life of wire rope in this particular service? The wire-rope experts all agree that 12 to 15 days is a fair life — but, if the operator really wants to keep records that are useful and comparable the life of the rope should be in terms of cubic yards handled and not days, for obvious reasons. For the hoist lines on a dragline or shovel the life should be some where near twice as long as for the dragline cable.

The proper kind and type of rope to use for the service described is 6x19 Preformed, Improved Plow Steel, Lang Lay, Independent Wire Rope Center. On that there is agreement among all the experts. The advantages of preformed wire rope have been determined independently by the operator in this case, and his original difficulty in winding on the drum was the chief reason for going from regular to preformed.

In place of the type and kind described above the operator could use a 6x19 or a 6x21 Seales type, or in the opinion of two manufacturers, a 6x16 Preformed, Improved Plow Steel, Long Lay, I.W.R.C. rope.

Both types are recommended for their flexibility and for resistance to abrasive wear. This kind of service, where the rope is continually dragged through sand and grit, is about the most severe of any. In the opinion of most of the experts the operator does the right thing not to use lubrication, for the rope's life is too short to justify any more lubrication than most manufacturers supply when the rope is made (internal lubrication). One manufacturer has a heavy-bodied lubricant which he says is especially helpful in just such a case.

The human element in the dragline operation is very important. The experts agree that a dragline operator may cut the life of his cable in half by the way he applies his loads. Of course sharp, jerky loading is to be avoided since the stress in the cable is two or three times as much for suddenly applied loads as it is for gradually applied loads.

Again the human element enters in the care and inspection of sheaves, drums, fairleads, and their bearings. Sheave diameters should be ample for the size of the rope (45 times the diameter of the rope recommended, never less than 30 times). Grooves on sheaves and drums should be larger than the largest diameter of the rope. Clutches should be kept in such condition that they are not responsible for jerky operation.

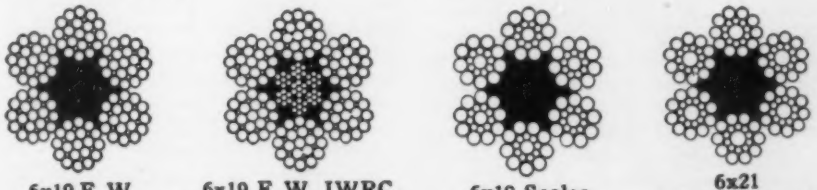
In buying wire rope for this or any other service always bear in mind that there are a variety of kinds and of qualities. If buying of a distributor he will be very apt to want to sell rope from stock, and it may easily be that he has not the proper kind in stock. Moreover, distributors may not know the proper rope to use for some purposes. Wire rope experts have been acquiring this knowledge by experience and observation over many years, and naturally they haven't yet imparted it to many distributors who are also handling a variety of other products.

It is important that the user of considerable quantities of wire rope seek the advice of the manufacturers directly; and that they keep their own records of wire-rope service in such a way that they can check up not only on the kinds and types of rope used, but on the care and efficiency of the dragline operators.

* * * * *

The case described is typical of the opportunities that exist in every operation to save cost by proper use of equipment. Knowledge of proper and efficient use of all kinds of mechanical equipment is always being accumulated and digested. The manufacturers of such equipment are always seeking opportunities to help their customers get the most service from it.

That is the whole history of American industry. To some people this does not look like good business for a manufacturer to tell a user of his equipment how to make it last longer, or give better service. This might result in selling less, it is true. But it does result in selling better quality products, and it does result in satisfied customers; and satisfied customers—repeat customers—are what every American manufacturer desires above all else.



6x19 F. W. | 6x19 F. W. IWRC. | 6x19 Seales | 6x21 Modified Seales

Various types of wire rope, each of which is designed for specific purposes

Fig. 1: Showing how flume proper, reaching to a point 400 ft. out over the river, has placed a bar of sand containing thousands of tons

Suspended Flume Used to Eliminate Excess Fines

By M. M. SMALL*

Disposing of excess fine sand in producing sand and gravel from the Kansas river is, to the casual observer, a very simple operation. It is a simple matter if the plant is set up only as a portable unit, but in the case of a stationary plant and when the river stays at a low stage, as it has for the past several years with comparatively few raises, the problem of disposing of excess fine sand and "holding the channel" develops into

•

Fig. 2: Steel tower on the south bank of the river from which one end of the flume is suspended by means of heavy cables. Plant to the left

•

a very serious and costly item of production for this type of operation.

Under normal conditions the fines are sent back to the river with the large amount of waste water, which is returned to the stream by means of a flume.

Problems Involved In Disposing Waste Sand

For the past several years, the stage of the Kansas river has been much below normal, the river not carrying enough water to wash away the fines which must be disposed of. It is natural, of course, to return these fines to the down stream side of the screening plant, which is located on the bank at the river's edge, as shown in Fig. 1.

The Kansas river carries a great excess of sand of a size for which there is not a ready market. This must be disposed of in the most economical manner. The amount of waste sand will vary according to the size of material that is being produced to meet various specifications. Over a period of one year's operation, the producer will return to the river approximately 40 percent of the material he has pumped to his plant.

Waste sand in this proportion soon builds a bar of thousands of tons on the down stream side of the screening plant with the result that the channel of the stream is then forced to the opposite side of the river. The producer is then compelled either to move his barge over to the channel or be faced with the hazard of having a sandbar form under the dredge and pontoon.

Either condition is very costly, as the power cost immediately goes up when the pumping head is increased by several hundred feet of discharge line.

In the event that the pontoon line is not lengthened and the operation is carried on in the water outside of the main channel, the sand bars start forming under the river equipment. The dredge can be kept floating, as enough material can be pumped from directly under it. However, as the pontoon line is now on a sandbar, it is impossible to move back and forth over the river, and the area over which the dredge can operate is reduced to a minimum.

To insure production under this condition another heavy expense is involved: that of "lengthening out" or putting in additional pontoons and discharge line. The hazard of a flood with such a long pontoon line extending across the river must also be considered.

Under this condition, it is impossible to pump the "wash material" which is being carried down the river by the channel. The cost of producing this material is much lower than producing the virgin material, as the river itself has taken care of all of the washing problems for the producer. All that is required to convert this material into a marketable product is to size it and remove the "excess fines."

The Victory Sand and Stone Co., having operated from one location over a period of five years, with only one raise

*Mr. Small is secretary-manager of The Victory Sand and Stone Co., Topeka, Kansas.

in the river of any consequence, has created a bar to the down stream side of the screening plant, which developed into a real menace.

In the winter of 1936-37, a suspended flume was constructed (designed by the writer) to carry the excess fines to the far side of the river which has proved to be the solution of the following four production problems:

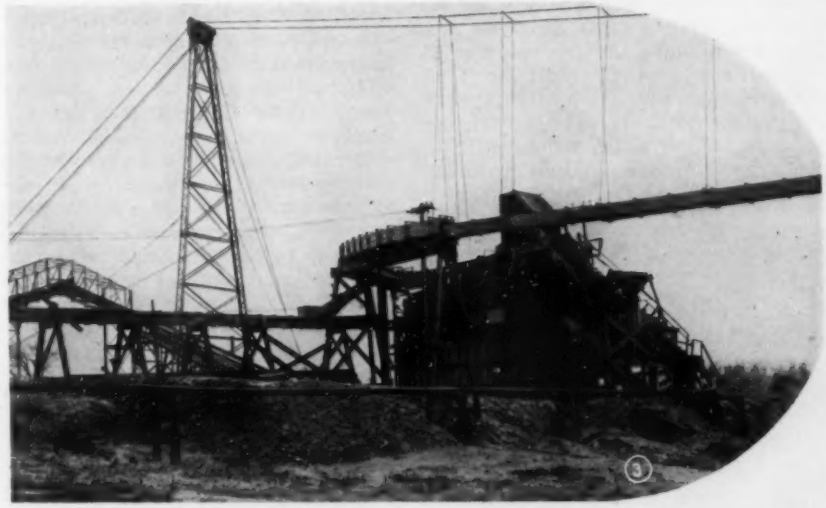
1. The flume places the waste sand on the opposite side of the river.

2. It has forced and now holds the channel to the plant side of the river, and has cut and carried away the great sandbar the company had created.

3. It has reduced the power cost per ton, as it permitted the barge to operate over an area much closer to the screening plant, which shortened the discharge line, reducing the pumping head.

4. It has given access to thousands of tons of material which otherwise would have been inaccessible.

As shown in Fig. 1, the flume proper reaches to a point 400 ft. out over the river and during the 1937 season had placed a bar of sand containing thousands of tons of this wasted material.



This particular view was taken from a point approximately 700 ft. downstream from the flume. It will be noted that the barge to the left has been operating a considerable distance down stream from the plant; at a location where only one year ago the sand bar extended far out into the river and was higher than the roof of the housing on the barge.

The flume is suspended by two 1½-in. cables 30 in. apart, and is supported by two towers spaced 940 ft. apart. The steel tower on the south bank of the river, as shown in Fig. 1 is 53 ft. high; and the timber tower on the north side of the river, Fig. 4, is 25 ft. high.

Block and Tackle Used to Raise Flume During Flood Stage

During a flood stage the flume can be raised out of danger from drift, etc., by the block and tackle arrangement shown in Fig. 2. On each cable there is a triple and double block, which remain in the line and are threaded with the pull line extending back to the spools. If at any time the flume needs adjusting (raising or lowering), the pull lines can be taken from the reels attached to separate trucks and pulled or slacked off to suit the water level condition of the river.

The supporting cables are anchored to reinforced concrete deadmen made in a triangular shape, the wide side facing the towers. The deadmen were placed approximately 6 ft. below the surface, sloping on the angle of the cable extending to them.

On the underside of the deadmen, and extending to the water line (approximately 20 ft.), poured concrete posts 8 in. in diameter were placed, 2-ft. centers, with reinforcing bars extending from the main body of the deadmen through the full length of the posts. This added much to the holding capacity of the deadmen with a minimum amount of concrete yardage.

The head block on the steel tower, in Fig. 2, is equipped with an axle extending through a sheave for each cable. When it is necessary to raise or lower the flume, this arrangement gives the minimum amount of friction at a point where there is a hard pull on cables.

In Fig. 3, at the point where the suspended flume joins the stationary or bank flume, one can readily note that the two outside cables are tight and the two inside ones are loose. The outside cables are made fast to deadmen directly beneath them to hold the upper cables down to a point where the suspended flume cannot raise higher than the stationary flume. When the suspended flume is not loaded, the catenary of the supporting cables changes to such a degree that it would break this connection if these tie cables were not provided. When the load goes on the suspended flume, the inside cables tighten and hold the flume in a position to form a grade that will permit the water and sand to be carried through it.

Fig. 3: At the point where the suspended flume joins the stationary or bank flume, the two outside cables are tight and the two inside are loose. The outside cables are made fast to "deadmen" to hold cables down to a point where suspended flume cannot raise higher than stationary flume

Telescoping Type Flume

Fig. 4 shows in detail how the flume was constructed and assembled. The flume, to be flexible, was made in 12-ft. sections, the downstream end of each section extending into the section ahead.

(Continued on page 51)

Fig. 4: Shows how flume is constructed and assembled in 12-ft. sections, the downstream end of each section extending into the section ahead.
Fig. 5: Original stationary flume, on the right, and suspended flume, to the left

Clinker Conditioning Cuts Grinding Costs

"Electric Ear" Controls Mills At Silica, Ohio Plant

With grinding responsible for something like a third of the total power consumed in manufacturing cement, plant operators are giving much thought as to how to get the most out of their mills. In no two plants will the same grinding arrangement give identical results. A new grinding circuit installed at one mill with satisfactory results might not work at all in another mill. There are too many variables.

At Silica, Ohio, Medusa Portland Cement Co., has tried three entirely different arrangements for grinding clinker in the past few years, and has now settled on a method that is probably not duplicated at any other mill. It is of interest to compare the various methods and their performance.

For the sake of review, this is a wet process plant operating three 10- x 150-ft. kilns with a combined capacity of 135 bbl. per hour. In a previous article (ROCK PRODUCTS, October, 1937, p. 35), a series of improvements were described including: revamping of the entire raw grinding department; installation of heat recuperators and two-stage clinker cooling, unit mills to fire the kilns; and closed-circuiting of the clinker grinding compartment mills with an air separator.

Constant Improvement Program

These improvements were effective in reducing operating costs, increased the grinding capacity for both raw materials and clinker, and produced a clinker easier to grind. The raw grinding department (wet process) comprises preliminary grinding through two type 85 kominuters in circuit with six Tyler Hum-mer screens with a total capacity of 200 bbl. of slurry having a fineness of 97½ percent minus 100-mesh.

In discussing the new grinding hook-up on clinker and comparing performance with what preceded, newer methods of cooling and conditioning the clinker of course have a decided effect.

Prior to 1936, clinker was cooled to about 550 deg. F. through rotary, single-stage coolers and was ground in three 7- x 22-ft. Compeb mills. The first 7 ft. of length of the mills were the preliminary sections with 14 ft. of length effective as tube mills. Capacity of each mill was 50 bbl. of portland cement but the surface was only 1425 sq. cm. per gram. The mills each had center feed and peripheral discharge.

Air separation was introduced in 1936 for the first time, and clinker cooling was reduced from 550 deg. to about 150 deg. by the addition of Vanderwerp heat recuperators on the kilns, followed by a rotary cooler. The clinker discharging from the secondary cooler was placed by Peck conveyors into three 1000-bbl. mill feed bins.

An 18-ft. Raymond mechanical air separator was installed in closed-circuit with two of the 7- x 22-ft. compartment mills, with an arrangement that the third mill could be operated either in open circuit or in conjunction with the air separator. The compartment grid bars were opened up to approach tube mill conditions when air separation was added. Clinker feed into each mill was regulated by a variable speed, motor-driven belt feeder with a constant slot opening and synchronized with the gypsum feed. With this installation it was hoped that two mills would be sufficient, but the third mill was necessary. The mills were fed by rocker-type feeders and the separator rejects returned into the mills with the fresh feed. Capacity of each mill, in this setup, was 60 bbl., an increase over that for open circuit, and the surface increased

Left: Center discharge of compartment mill now connected to preliminary ball mill

Below, to the left: Six single-deck, electrically-vibrated screens over which the ball mill discharge is split at 20-mesh, preparatory to tube-milling. Right: Chute through which plus 20-mesh material from the vibrating screens is returned into the ball mill at the opposite end to the fresh feed

to 1550 sq. cm. per gram. The circulating load was maintained at about 75 percent of the feed in bbl., the feed into the separator from each mill consisting of 105 bbl. per hr., with a reject stream of 45 bbl. per hr. added to the fresh feed of 60 bbl. per hr.

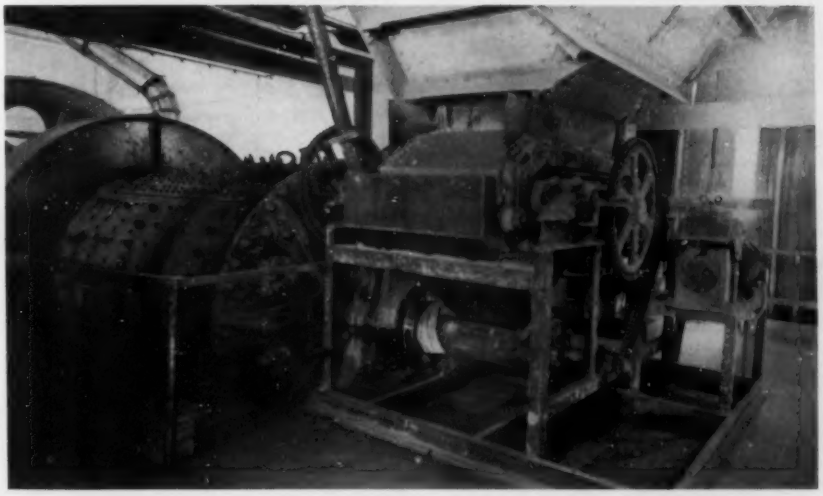
Convert Compartment Mill Into Ball Mill

After operating this circuit for a short time, the entire finish grinding department was revamped to increase further the specific surface. One of the compartment mills was converted into a preliminary ball mill with double-end feed and common center discharge, leaving the other two compartment mills now converted to straight tube mills for finish grinding. The preliminary mill is closed-circuited with screens and the two tube mills with the 18-ft. Raymond air separator.

The clinker, which is hard-burned and cooled to 150 deg. F., is fed into one end of the mill (axial feed) from the 1000 bbl. capacity bin overhead. Clinker is introduced into the ball mill over a chain-belt, pan feeder with gypsum proportioned into the pan feeder off the same drive. The feeder arrangement is driven by a constant speed motor.

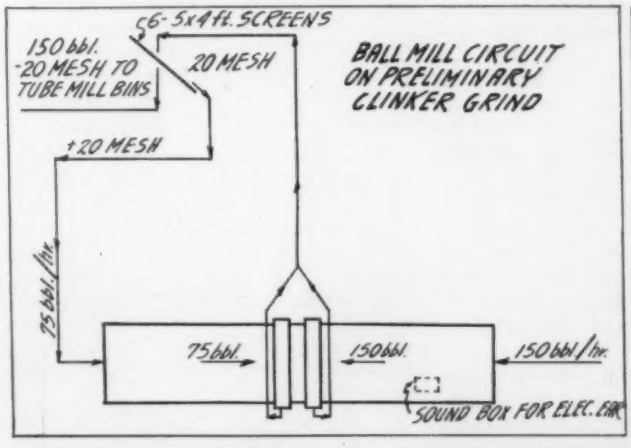
Feed into the ball mill is regulated by a Hardinge "electric ear," a recent development which was designed to prevent overloading or underloading of grinding mills. The unit consists of a sounding box, which is tuned to a definite sound in the mill while revolving, and is set to maintain this sound, which is a measure of the mill loading. The sounding box is set close to the mill and is in circuit with an electric switchbox for starting and stopping the mill feeder motor. The bed of clinker resting on the open feeder is first regulated and the sound box adjusted to shut off the feed when a dull sound indicates that the mill has too great a load for the best grinding efficiency. The instrument has proved far more sensitive than the human ear and eliminates the human element. Needless to say, the use of the electric ear has helped to maintain a constant and definite circulating load between the screens in circuit with the mill. The "ear" can be tuned to give a definite mill output or fineness of grind.

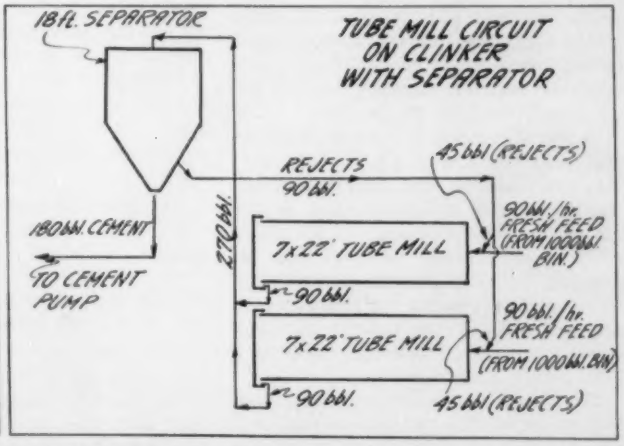
The half of the mill in which maximum grinding takes place (controlled by the "ear") is charged with 500 5-in., 500 4-in., 1000 3½-in., 2000 3-in. and 2000 2½-in. forged steel balls weighing a total of 16.4 tons. This end of the mill discharges peripherally through ¼-in. openings in the grid bars into a sump and is fed in equal proportions to six 5- x 4-ft., single-deck Tyler Hummer screens by a chain bucket elevator, 60-ft. centers, and 16-in. screw conveyors. Screens have No. 636 "Ton-cap" cloth and make a separation at 20-mesh. The rejects are spouted axially into the opposite end of the ball mill and discharge at its center into the same sump into which the other end of the mill discharges. The grid bars on the tailing end of the mill are spaced at 3/32 in. and the grinding media are forged steel balls graded from 2½- to 1- in. diameter.



Above: General view of Medusa Portland Cement Co. plant at Silica, Ohio

Below: Preliminary clinker grinding ball mill with double-end feed and center discharge. Feeder on right regulated by ball mill sound as picked up by sound box which is installed near the lower side of mill





Left: Flow diagram on preliminary clinker grind. Note "electric ear" installation to regulate feed. Right: Tube mill in closed circuit with separator in finish grinding

As shown in the accompanying flow diagram, on the preceding page, the ball mill is producing 150 bbl. of minus 20-mesh material per hr. with a circulating load of 50 percent.

The minus 20-mesh material passing through the Hum-mer screen cloths is then tube-milled through the other two 7- x 22-ft. mills. By increasing the tube milling grinding length from 14 ft. to 22 ft., there is of course that much more length effective in producing the necessary "flour" to get a high specific surface cement.

Minus 20-mesh material is split as desired into the two 1000-bbl. feed bins over the mills. These bins originally contained clinker but in the present layout furnish plenty of reserve should a ball mill break down. Tube mills, each of which is charged with 50 tons of ⅞-in. Jeffrey mangenoid grinding media, receive their feed axially and discharge peripherally.

Feeders of Special Design

The tube mills are closed-circuited with the 18-ft. Raymond air separator having a circulating load designed to give several passages of the material through the mills. Material (20 mesh) is fed from the large bins through an inclined screw dog leg feeder followed by a trunnion screw feeder, both of Medusa design. The feeders are driven through variable speed motors. Each of the bins is provided with compressed air lines near the bottom to aerate the material.

Capacity of each mill is 90 bbl. of standard portland cement per hr. with a 1600 to 1800 sq. cm. per gram surface. The circulating load is 50 percent, as shown in the diagram. Output in bbl. is the equivalent of that produced before with three mills and the air separator, but the surface is much better. Grinding costs have been reduced and maintenance expense is much lower. The power load can be more easily balanced. Generally the ball mill is kept operating all the time. One tube mill operates continuously and the other half-time, which is usually sufficient capacity. Each of the three mills revolves at 20 r.p.m.

In the mill room, a Parsons bag-type dust collector of 2700 sq. ft. cloth surface has been installed with ducts leading to the mill discharges and at the top of the bucket elevator to the separator. The collector relieves the air pressure built up in the elevator and recovers fine cement particles, which are returned into the tailings. Finished cement is pumped into the silos by a 6-in. Fuller-Kinyon pump.

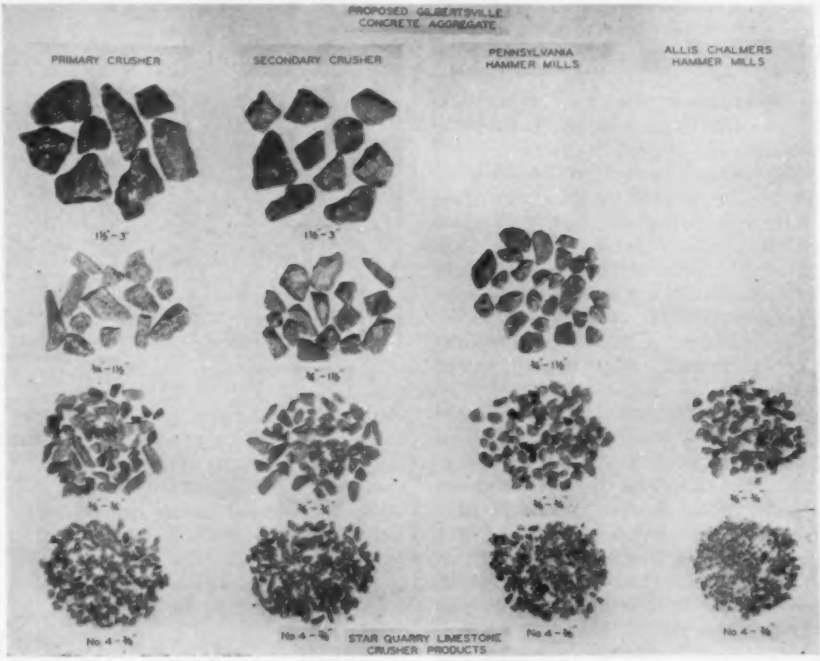
The third and concluding article of this series on Medusa improvements will describe the changes at the Wampum, Penn., plant.

Crushing For Cubical Stone

Our attention has been called to the article "Demands for New Products Require Plant Changes," published in the January issue of ROCK PRODUCTS.

The following paragraph appears on page 40:

"Government engineers still adhere to the conventional hammer mill for large scale production of stone sand, despite opinions that the product is apt to be too slivery. At Hiwassee dam, near Murphy, N. C., the same hammer mills used in the earlier Norris dam aggregate plant are producing stone sand from a highly siliceous rock containing 65 percent quartz. Blending and gradation facilities, however, are more highly developed than would be possible in smaller scale operations, and serve to overcome many of the shortcomings due to angular and slivery shape of particle."



Showing particle shape produced by different types of crushers

Although there might be some argument as to just what is the prevalent opinion, our past experience has been that hammer mills are generally considered to produce a more cubical product than other types of crushers commonly used.

However, in selecting crushing equipment for our plants, we have considered each case on its own merits, based on previous tests, and have not based our decisions on any general assumptions. One of several factors to consider is that of particle shape. Any differences in this respect are determined by carefully conducted tests. So far, our tests have shown that hammer mills produce a more cubical shape than other commonly used types of crushers. The difference apparently is not of the same magnitude for all kinds of rock. In the case of the Norris dolomite, the superiority of the hammer mill product is very marked. This is also true of a rock being considered as a source of aggregate for Gilbertsville Dam. If you refer to the illustration, you will note the difference in particle shape between the hammer mill product and that of the other crushers. Workability tests also showed very conclusively the superiority of hammer mill product.

In the case of the graywacke used at Hiwassee Dam, the difference between hammer mill product and that from other machines is not so marked. It is not as easy to detect visually as in the case of the two rocks mentioned above. Workability tests, however, again are in favor of the hammer mill product, although to a lesser degree than in the case of the dolomite or the Gilbertsville rock.

Yours truly,

T. B. PARKER, Chief Engineer,
Tennessee Valley Authority

Washing-Classifying Sand

Part 2.—On Theory and Practices of Washing

By EDMUND SHAW

Plenty of water is the one essential for dilution and decantation. The clay must be sufficiently diluted so that too much of it does not stay in the voids of the sand with the remaining water, and also so that it will not interfere with the fall of the fine sand grains.

This last is important in washing concrete sand, because the minimum requirement of some specifications is more than the total of fine grains (minus 50-mesh) that was permitted not so many years ago. If the grains are not saved it may be necessary to purchase them from another producer.

In studying the settling of fine phosphate rock sands, it was found that even so little as 3% of colloidal clay in the water had a distinct effect on the settling of these grains, and that this effect increased very rapidly as the percentage of clay was increased. It was not hard to make a clay suspension that would not permit the fine grains to settle at all, in any reasonable time.

There are two reasons why clay in suspension interferes with the settling of fine sand. One is the nature of the clay and the other the raising of the specific gravity of the medium through which the grains are settling.

Everyone who has had experience in settling and classifying crushed ore knows that mill men recognize two kinds of clay, which they call primary slimes and secondary slimes. The first is the natural clay, formed by the disintegration of the rocks, which occurs in seams in the deposit. It is colloidal and sticky and contains few grains. The secondary slimes are formed by the pulverizing of the ore. There are colloids present, but there are also many fine grains, so fine that it takes a low-powered microscope to see them. The primary slimes interfere a great deal more with the settling of fine grains than the secondary slimes do.

The reason, according to recent investigators, is that the colloidal particles form what physicists call dispersed systems in the water. The particles are held in place and prevented from agglomerating and settling by the adsorption of ions resulting in the electrification of the particles and their mutual repulsion. Smoke and dust clouds in air are held up in the same way.

Water with colloidal particles forming such a dispersed system becomes a notably viscous fluid capable of resisting shear, and the settling of grains of fine sand is very slow because of that resistance.

There are ways of destroying these dispersed systems by using chemicals that will cause the particles to lose their electrical charges so that they will agglomerate. Lime, alum, and sulphate of iron are used in municipal water plants to settle clay in suspension, but they cost too much to use in sand washing. The best and cheapest way is to use sufficient water, so that the clay particles are much diffused.

Regarding the effect of clays which do not form viscous fluids, it can be shown by the formula for the falling rate of fine grains: $V = 450\ D^2\ (\Theta - \Delta)$ in which V, the falling velocity of the particle and D, its diameter, are in millimeters; Θ and Δ are, respectively, the specific gravity of the grain and the specific gravity of the fluid through which it is falling. The effect is due to increased buoyancy.

For water $\Delta = 1$; for suspensions of clay in water it will be the specific gravity of the mixture. With 10% of clay this would be 1.065, the specific gravity of the solids being 2.64. For equal grains in water, and in water with 10% of clay, the ratio would be,

$$V_1 : V_2 = (\Theta - 1) : (\Theta - \Delta)$$

or as 2.64—1 is to 2.64—1.065, or as 1.00 is to 0.960. Hence even 10% of clay would not slow down the grain very much, if the clay was not of a colloidal nature.

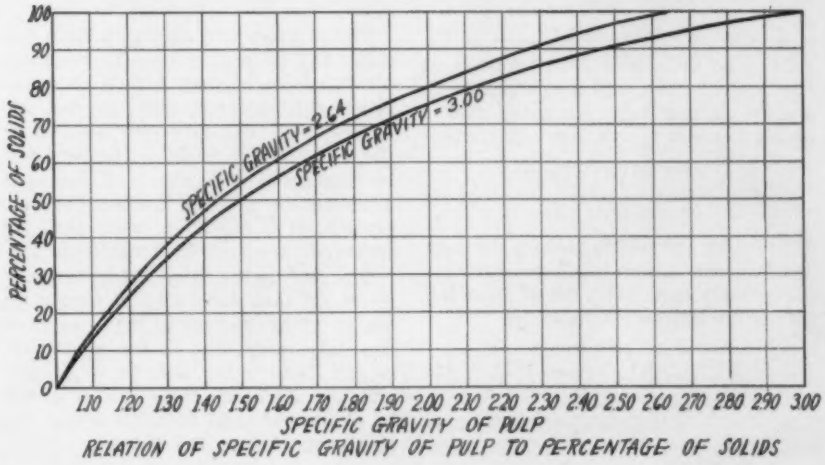
It pays to study such things. In one case a saving of $40 per 10-hour day was made by increasing the water used so that the fine sand could settle, and by putting in the proper arrangements for collecting it. The plant was not a large one.

Clayey Water In the Sand Voids

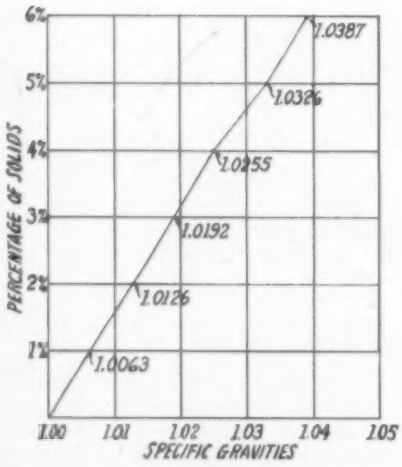
So far as the washing of the sand is concerned, the purpose of using plenty of water is to prevent the water remaining in the voids of the settled sand from carrying too much clay. It is a simple matter to calculate how much clay remains with the sand in this way, but exact results cannot be obtained. The scrubbing is almost never complete, and a little clay always settles with the grains, if fine sand is settled.

It is also possible for the sand to retain less clay than it should theoretically. This has been noted with some coarse sands, and perhaps the cleanliness was due to the water draining away from them carrying some clay. Another reason may be that the settling of the sand grains keeps little currents of water rising through the grains and this forms a layer of clearer water just above the grains, so that there is some washing by displacement. I regret that when I had the opportunity I did not study this effect, but at the time it was enough to know that the classifier was doing a little better work than it was supposed to do.

However, the value of the method is not lessened because the results are not quite exact. They are exact enough to use in designing a plant, and they are a great help in investigating the work of a plant. And if the washing is not good enough it is simple to use more water, or if more water is not available



RELATION OF SPECIFIC GRAVITY OF PULP TO PERCENTAGE OF SOLIDS



Relation of specific gravity to percentage of solids for suspensions of less than 5 per cent solids, specific gravity of solids, 2.64

to decrease the feed. The calculations will serve as a guide in doing this.

In preliminary work, samples are washed and the clay remaining with the sand and removed by the overflow are noted. It is the usual practice to dry the samples and weigh the solids, but sufficiently accurate results may be obtained by the specific gravity method. Before this can be used the specific gravity of the sand and clay must be determined, using the methods which have been standardized by the American Society for Testing Materials and similar organizations. The specific gravity of the pulp (sand and clay mixture) is obtained by weighing a sample, taken with the proper precautions. If a liter is weighed in grams, the specific gravity is the weight divided by 1000, but any bottle may be used by weighing it empty and filled to a mark with water and computing from the weight of the water to 1000 grams.

The formula for finding the percentage of solids by weight is,

$$p \text{ (percentage)} = \frac{100\ s(a-1)}{a(s-1)} \qquad (1)$$

in which s is the specific gravity of the solid, sand or clay or both together, as the case may be, and a is the specific gravity of the pulp. Assuming that s equals 2.64 and a, 1.77, and substituting:

$$p = \frac{100 \times 2.64 \times (1.77-1)}{1.77 \times (2.64-1)} \qquad (2)$$

This works out to 70; that is the pulp has 70% solids.

There are some other useful formulas. One is the dilution formula,

$$D \text{ (dilution)} = \frac{1}{p} - 1 \qquad (3)$$

For the pulp with 70% solids the dilution would be 1/0.70—1, or 0.428. That is, the weight of the water is 42.8% of the weight of the solids.

The value of a may be found by solving equation (1) for a,

$$a = \frac{s}{s-p(s-1)} \qquad (4)$$

It may also be found from the dilution by the formula

$$a = \frac{D+1}{D + \frac{1}{s}} \qquad (5)$$

Substituting, $a = (0.428 + 1) / (0.428 + 0.379) = 1.77$.

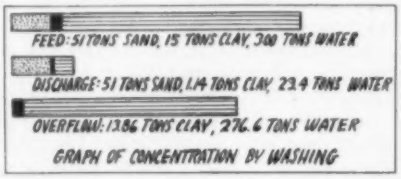
Investigating a Deposit

As an example, suppose the deposit being investigated contains per 100 tons,

Clay .....15 tons
Sand, 60 percent of 85 tons.....51 tons
Gravel, 40 percent of 85 tons...34 tons

For a trial, 396 tons of water per 100 tons of the deposit will be assumed, because this insures a dilution which will not interfere with the settlement of the fine sand. The gravel will be neglected, as will be the water which drains away with it. For washing then, the 396 tons of water will be mixed with 15 tons of clay and 51 tons of sand.

Although only 100 tons are spoken of, the process will really be continuous, and it will be assumed that the discharge of a drag belt used for dewatering will contain 70 percent solids. It is possible to discharge a dryer pulp, but the way drag belts are run in sand


FEED: 51 TONS SAND, 15 TONS CLAY, 300 TONS WATER
DISCHARGE: 51 TONS SAND, 1.4 TONS CLAY, 23.9 TONS WATER
OVERFLOW: 13.86 TONS CLAY, 276.6 TONS WATER
GRAPH OF CONCENTRATION BY WASHING

washing, dryer discharges are not often seen, according to the writer's experience.

The overflow will contain a little fine sand, but its weight may be neglected for this investigation. A little clay may settle with the sand, but this, too, will be neglected, and only the clay held by the water in the voids of the sand will be considered. The clay and the sand are supposed to have the same specific gravity, or so nearly the same that the difference need not be considered.

The feed to the drag will be 396 tons water, 51 tons sand and 15 tons clay; the overflow (including for a moment the water remaining in the sand) will be 396 tons water and 15 tons clay; and the discharge from the drag will be 51 tons of sand with the water and clay remaining in the voids.

Using the formulas given above, we get the figures in this table:

	Dilution	Specific Gravity	Percent Solids
Feed	6.00	1.095	14.28 (*f*)
Overflow	26.4	1.023	3.65 (*t*)
Discharge	.428	1.77	70.0 (*c*)

There are two or three ways of finding how much clay remains with the sand, the surest being to dry a carefully taken sample of the sand product and weigh it, and then to wash out the clay and dry the sand and weigh, obtaining the weight of the clay by difference. This should then be checked as nearly as possible (there is usually some loss) by settling the clay and drying and weighing it.

For investigation and to check plant operation, the clay in the sand may be computed from the figures given in the table above. The most exact method of figuring is by the use of the concentration formula, which is used in metallurgical work. The assays of the products in the metal to be saved are generally used, but in this case the percentages of solids are used.

The formula is:

$$\text{Recovery} = \frac{100\ c\ (f-t)}{f\ (c-t)}$$

The drag belt discharge is considered the concentrate and the overflow the tailing. Substituting the values for c, f, and t given in the table above:

$$\text{Recovery} = \frac{100 \times 70\ (14.28-3.65)}{14.28\ (70-3.65)}$$

This solves to 78.5; that is, 78.5% of the sand and clay are in the discharge; 78.5% of 66 is 51.8. We know that of this, 51 tons is sand, and the clay is therefore 0.8 tons. The percentage of clay is 0.8 divided by 51.8, or 1.55%.

The writer has worked out another method which he thinks is easier to understand:

If the discharge is 70 percent solids, 1000 grams would contain 700g solids and 300g water. As the clay suspension contains 3.65% clay, the 300g water is 100—3.65, or 96.35 percent. Dividing 300 by 96.35 gives 312.2 as the weight of the clay and water, and 312.2—300 gives 12.2 as the weight of the clay. As the weight of the sand and clay is 700g, the percentage of clay may be found by dividing 12.2 by 700, which gives 0.016. This is the same as 1.6%, the percentage of clay in the sand.

A third method is to use the formula for the two mixtures of two substances of different specific gravities:

$$\text{percentage of heaviest} = \frac{100 \times s\ (a-A)}{a\ (s-A)}$$

This is the same as the formula for finding the percentage of solids from

(Continued on page 48)

More Highway Business to Metropolitan Producers

By NATHAN C. ROCKWOOD

Fifteen years ago a question I frequently heard asked was: "Where will business come from when all the main highways are paved?" Main highways in the most populated parts of the country are all paved; and the question is about to be answered, probably by greatly expanded federal highway building activity. The genesis of the answer is contained in a report by the Bureau of Public Roads, U. S. Department of Agriculture, to the present session of the Congress of the United States.

It may be recalled that several bills to construct a system of national super-highways were before the Congress in 1938 and action on them was headed off by a resolution requesting the Bureau of Public Roads to report on these. This report is a very commendable and constructive piece of work; and already both Congress and the Administration are beginning to think of highway development in terms of it.

The report is in two parts: (1) The feasibility of a system of transcontinental toll roads; (2) a master plan for free highway development. The first part is designed to eliminate consideration of toll roads by showing that there is slight possibility of traffic paying for them at such toll rates as 3.5c per vehicle mile for trucks and busses, 1c per mile for pleasure cars. While it is admitted that there are a few heavily traveled sections of highways which could pay off on that basis, the best prospect being between Washington, D. C., and Boston, Mass., the toll-road scheme as a whole is declared "not feasible."

Master Plan Highways

The substance of the report is an implied recommendation to forget about superhighway toll roads and consider a more logical master highway plan for the entire nation. Such a plan can be carried out through action by the federal and state governments and the municipal and county subdivisions. By joint federal and state contributions the following undertakings can be carried on:

(1) The construction of a special, tentatively defined system of direct interregional highways, with all necessary connections through and around cities, designed to meet the requirements of the national defense in time of war and the needs of a growing peace-time traffic of longer range.

(2) The modernization of the federal-aid highway system.

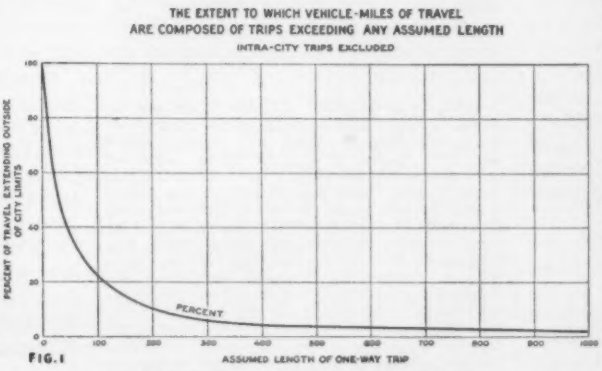
(3) The elimination of hazards at railroad grade crossings.

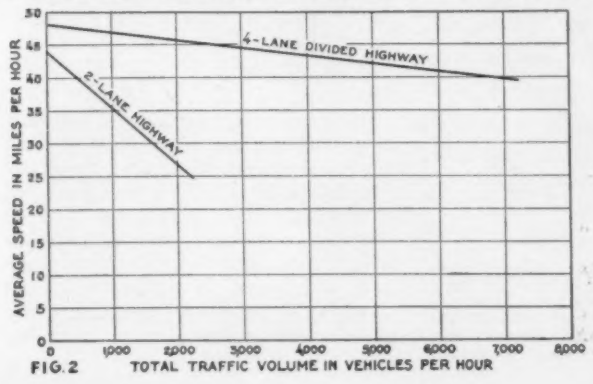
(4) An improvement of secondary and feeder roads, properly integrated with land-use programs.

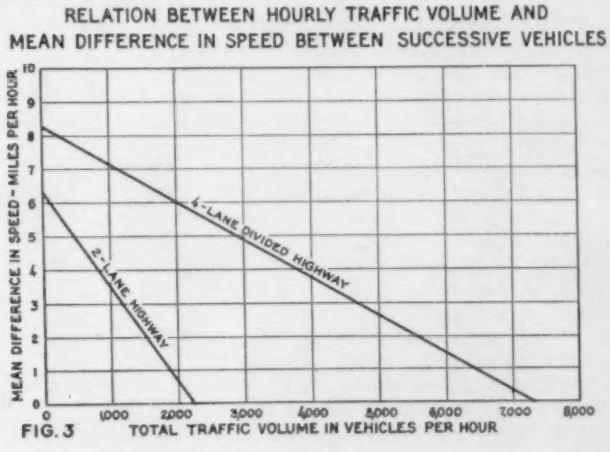
(5) The creation of a Federal Land Authority empowered to acquire, hold, sell and lease lands needed for public purposes and to acquire and sell excess lands for the purpose of recoupment.

The report is based largely on the results of highway planning surveys in 46 of the 48 states. Of course, so-called transcontinental traffic is hard to estimate, but taking all vehicles that cross the states of Idaho, Nevada and Arizona going to and from the Pacific Coast, the count in 1937 was 2532 average daily, and of these only about 300 were from the Atlantic Coast states, and 800 from states east of the Mississippi River. Similar studies were made on north and south travel. A fourth of automobile trips were shown to be less than 5 miles, and the average trip is around 15 miles (Fig. 1).

When these traffic counts are plotted on inter-city maps they show a pronounced traffic congestion immediately around the cities and on a few important routes between cities. Bypasses around the cities are not what are needed most because only about 10 percent of the incoming traffic is going through or beyond the city. What is most needed, the report brings out, are inner and outer belt highways, intersecting the main thoroughfares ("distributing highways"). This would permit the preponderant city-bound traffic to reach the part of the city desired without going into the city or traffic center. Vice-versa, it would permit outbound traffic to reach its proper highway without passing through the city center.


THE EXTENT TO WHICH VEHICLE-MILES OF TRAVEL
ARE COMPOSED OF TRIPS EXCEEDING ANY ASSUMED LENGTH
INTRA-CITY TRIPS EXCLUDED
PERCENT OF TRAVEL EXTENDING OUTSIDE OF CITY LIMITS
PERCENT
ASSUMED LENGTH OF ONE-WAY TRIP
FIG. 1


RELATION BETWEEN AVERAGE SPEED AND HOURLY TRAFFIC VOLUME
AVERAGE SPEED IN MILES PER HOUR
4-LANE DIVIDED HIGHWAY
2-LANE HIGHWAY
TOTAL TRAFFIC VOLUME IN VEHICLES PER HOUR
FIG. 2


RELATION BETWEEN HOURLY TRAFFIC VOLUME AND
MEAN DIFFERENCE IN SPEED BETWEEN SUCCESSIVE VEHICLES
MEAN DIFFERENCE IN SPEED - MILES PER HOUR
4-LANE DIVIDED HIGHWAY
2-LANE HIGHWAY
TOTAL TRAFFIC VOLUME IN VEHICLES PER HOUR
FIG. 3

LOCATION OF EXISTING ROUTES TENTATIVELY SELECTED
AS APPROXIMATING THE LINES OF A PROPOSED
INTER-REGIONAL HIGHWAY SYSTEM

FIG. 4

Once in a city, the block system of streets permits alternate routes. It is really at the entrances to the street system, or the terminals of the through highways that there is the greatest congestion, and consequently the greatest need of new highway facilities. The desirability of meeting this problem immediately is strongly emphasized in the Bureau of Public Roads report. In the case of the small cities through highways can be relocated to bypass the city streets, as is often the case with existing routes.

The proposed belt line highways, encircling the cities, in many cases would be limited-access facilities, with all intersecting highway grades separated and access provided only from the more important routes. Such routes would require four lanes of traffic, or more. But once in the open country the state highway planning surveys showed that there is no great mileage of existing routes that requires increase in the number of traffic lanes. Unsatisfactory conditions in respect to sight distance, grade and curvature are of common occurrence.

Needed New Construction

The modernizing, or new construction, needed on a large mileage of existing state and federal-aid highways includes the reduction of excessive curvature, the flattening of heavy grades, an opening of longer sight distances, a general widening of pavement lanes, a construction of additional lanes and separation of opposing traffic where increased volume requires, and possibly also for the accommodation of slow vehicles on the heavier grades, the separation of grades at many railway and highway intersections, abatement of dangerous roadside conditions, and a substantial improvement in the general directness of alignment. Where traffic exceeds 2000 vehicles per average day more than two traffic lanes would be required.

The effect of traffic volume on the speed of vehicles, and hence on the capacity of the road is shown in Figs. 2 and 3, based upon Bureau of Public Road studies. This relationship is explained thus:

With a zero traffic volume there are no vehicles and consequently there can be no value for vehicle speed, but vehicle speed at zero traffic is approximated when a vehicle moves by itself, so separated from other traffic that the driver is not influenced by the presence of other vehicles on the road. His speed is then uninfluenced by that of other vehicles, and represents a free choice at the particular time on the particular road. The average speed for all vehicles using the road under that condition was, in the case of the 2-lane width, 44 miles per hour, and on the divided highway 48 miles per hour. Increase of the total traffic volume to 500 vehicles per hour resulted in a decrease of the average vehicle speeds to 40 and 47.5 miles per hour respectively, and at a volume of 1,000 vehicles per hour in both directions, the speeds became 35.5 and 47 miles per hour. It is significant that there was no serious reduction in speed with increasing volumes on the 4-lane road and also that at low traffic volume the traffic moved faster over the divided highway, with its invitation to faster and safer travel, than over the 2-lane road.

It has been found that the average speed of all vehicles does not represent a final criterion of the freedom of movement or congestion. Results of various analyses show that the average difference in speed between successive vehicles is a much more positive index of congestion. In periods of light traffic when passing is generally unrestricted, any desired difference in speed between successive vehicles may be maintained. As the traffic volume increases the opportunity for passing diminishes, lines of vehicles form and, accordingly, the difference in speed between successive vehicles becomes less, even though the average speed of all vehicles may not be affected greatly. Fig. 3 shows that such difference in speeds is a much more sensitive index of congestion than is the average speed of all vehicles. This graph shows, for roads of the different widths, the mean difference in speed between successive vehicles under various traffic volumes.

Here again, a straight-line relation exists between the traffic volume and the speed differences, again indicating that there is an effect on the freedom of movement even with relatively light traffic volumes, and that there is no point at which congestion suddenly occurs.

Beginning with a speed difference of 6.4 miles per hour at zero volume, this figure on the 2-lane road drops to 3.5 at 1,000 vehicles per hour in the two directions, while the initial speed difference on the divided highway of 8.3 miles per hour drops only to 7.1 at 1000 vehicles per hour. To restrict the freedom of movement on the divided highway to a speed difference of 3.5 miles per hour requires a total of over 4000 vehicles per hour, or over 2000 vehicles per hour in each direction.

It is not proposed to cease improvements of feeder or secondary highways, but the plan suggested (Fig. 4) would provide an inter-regional base system as a substitute for the proposed toll superhighway system.

The difficulty in carrying out such highway modernization as described comes chiefly from the necessity of much wider rights-of-way. To overcome this and to help provide funds for the improved constructions it is proposed that the Federal Government condemn and take wide strips of property in excess of the amount actually needed for the pavement and subsequently sell or lease this property after the improvements have been made.

This feature of the Bureau of Public Roads suggestions particularly appeals to President Roosevelt, who in submitting the report to Congress said he "laid great emphasis on this because by adopting the principle of 'excess-taking' of land for highways, the ultimate cost to the government of a great national system will be greatly reduced."

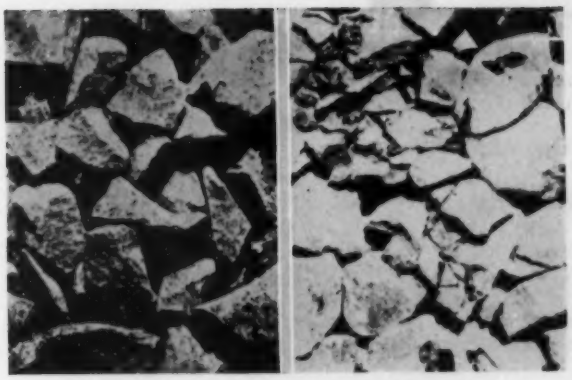
Significance of Proposed Plan

Commercial producers of aggregates for highway construction are only too well aware that for the past ten years more and more of their business has been slipping away to new small operators—in many cases using portable plants. The reason for this was obvious. Most of the important commercial plants were located near large cities, or at least in populous industrial localities. In these localities the highways were earliest completed. Subsequent highway building has been in the country—and in the last three or four years, pretty much on "farm to market roads," which did not require the kind of improvements using commercial aggregates.

While the construction of country road surfacing is by no means at an end, it is obvious that attention is being directed once more toward the great need of reconstruction of densely traveled highways in, around and between the large cities. This is the territory the large commercial plants were designed to serve, and it seems they are about to be needed to serve again in a big way.

Article III on Crushing, Sizing, Testing and Specifying Aggregates

By ELWOOD T. NETTLETON*



Properly, left, and improperly, right, sized stone for bituminous macadam highway

Simplification Aids Modernization

The previous article discussed the advantages to the consumer or user of simplifying and standardizing specifications for aggregates. The benefit to the producer is lower costs, which will permit modernization by elimination of losses on obsolete material and obsolete equipment.

These benefits fall into four classes as follows: (1) Plant and property investments, (*a*) fewer bins, (*b*) fewer screen sections, (*c*) less but more modern machinery, (*d*) less space required for stock piling; (2) Economical operation, (*a*) no overlapping of sizes, (*b*) fewer shut downs for changing screens, (*c*) better economy in stock piling; (3) Capital losses, (*a*) less financial loss due to obsolete material, (*b*) less financial loss due to obsolete equipment; (4) Good will of customer, (*a*) better quality product to customer, (*b*) better service to customer.

Producers' Problems

Of the many problems of the producer the only ones with which these articles are concerned are those problems or factors affecting the quality, grading, or cleanliness of the product sold to the consumer. These fall into three general classes: (1) those imposed by nature; (2) those imposed by operation; (3) those imposed by the consumer.

(1) The existence of trees, shrubs, dirt, and disintegrated stone determine the amount of stripping necessary, which, in turn, affects the cleanliness of the crushed product. Likewise the existence of seams filled with dirt affect the cleanliness of the crushed product. The physical characteristics of the stone affect the fracture of the stone in the crushers and also the amount of breakage of the stone in handling.

Rainy weather wets the stone in the quarry, making it very hard to screen properly the crushed stone in a dry plant so that the resulting product will be clean. At the present time practically all crushed stone operations are dry. Cold weather with snow and ice has the same effect in that it wets the stone. Furthermore, such weather usually causes a cessation of actual construction work in the northern part of the country, with

* Engineering Director and Secretary, New York State Crushed Stone Association, Albany, N. Y.

Typical quarry operation—this one requires little stripping

the result that quarries located there find less demand for their product at that time of the year. This means seasonal operation with stock piles for the usual small winter demand.

Operating Difficulties

(2) Operating problems are the most numerous and of many kinds. All of these factors have a bearing on the final product. Consumers or engineers would do well to consider this list before expecting perfection in laboratory attainment by commercial producers in the gradation of stone:

(*a*) Blasting and drilling—affects size of stone to primary crusher.

(*b*) Method of loading at quarry face —affects cleanliness of product.

(*c*) Crushing; (1) primary, secondary, or recrushing, (2) feed to crusher, intermittent or steady, (3) type of crusher, (4) size of crusher, (5) opening of crusher (setting), (6) reduction ratio of crusher.

(*d*) Screening; (1) type of screen, (2) length, diameter or width of screen, (3) pitch of screen, (4) speed of screen, (5) screening media, (6) screen openings, (7) new or worn screens, (8) vibration of screen, (9) amount of feed to screen, (10) intermittent or steady flow to screen, (11) near size particles in the feed, (12) mechanical elimination of dust.

(*e*) Bins; (1) location of feed chutes, (2) size of bin, (3) depth of bin, (4) shape of bin, (5) distance fall of stone, (6) tailings falling in, (7) cleaning of bins, (8) location of outgoing chutes, (9) covered or open bins, (10) spillage from one bin into another, (11) maximum and minimum size of stone in bin, (12) amount of stone in bins.

(*f*) Storage; (1) method of stock piling, (2) location of stock pile as to plant dust, (3) location of stock pile as to blasting, (4) method of reclaiming from stock pile.

(*g*) Shipments; (1) cleanliness of loading vehicle, (2) cleanliness of receiving vehicle, (3) distance fall of stone in loading, (4) vibration of vehicle in transit.

Besides this list of 40 operating variables there is also the chance of human error, such as pulling the wrong chute, mislabelling of cars, and misunderstanding specifications, terminology, or shipping instructions.

Probably this list is not complete, but in the writer's experience each one of these variables has come to his attention, at some time or other over a period of years, as affecting grading and cleanliness.

The indefiniteness, multiciplicity and diversity of specifications, overlapping of sizes, and the demand factor for various sizes all result in additional problems for the producer. As to multiplicity and diversity of size specifications, let us take a typical example:

The New Haven Trap Rock Co. is called on continually to meet the following list of different sizes:

	Number of Sizes
State of Connecticut	7
State of Massachusetts	7
State of Rhode Island	7
State of New York	7
Westchester County	7
Suffolk County	1
New York City	3
NYNH&H RR Company	1
Wocolite	2
Amiesite	2
Tarvialithic	3
U. S. Gov.—Federal Buildings	6
	53*

* Besides these there are the numerous personal specifications of individual engineers and architects for all the various uses of stone such as is shown elsewhere in this report.

Of this list not more than half a dozen individual sizes are specified exactly the same as to limits and tolerances. Perhaps it might be appropriate to state that under such conditions the employment of magicians rather than engineers might prove more suitable.

Overlapping of Sizes

Another problem for the producer which receives very little consideration from engineers in writing specifications is that which may be stated as the overlapping of sizes in any single set of specifications. Overlapping is a common occurrence where there are a large number of diverse specifications of various engineers to be met. Too often, however, it occurs in a single set of specifications.

For ease of explanation assume the above set of specifications. That is, that the engineer specifies the above seven sizes or grading of stone for various purposes. In meeting these specifications the producer can easily meet five of them, namely A, C, D, E, F, provided the tolerances at both limits are reasonable.

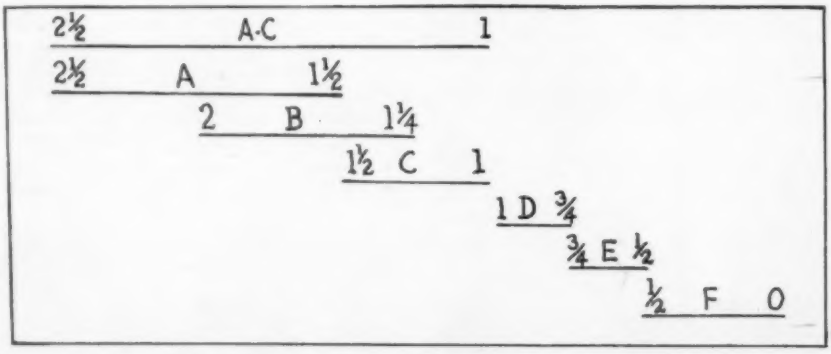
A-C can be met by combining all of A with all of C.

Size B, however, is what may be termed an overlapping size. To make B, the producer is forced to change screens and clean out his bins. Material from 2½ to 2 in. would have to be recrushed. If it were put with the A stone it would probably meet with rejection. Material from 1¼ to 1 in. would likewise either have to be wasted or recrushed into ¾ or ½ in.

Changing of screens and cleaning out of bins involves considerable expense and necessitates shutting down the plant. Furthermore, the chances are that A, B, and C stone is likely to be called for at the same time. This would mean that one or two of the sizes, as the case may be, would have to be loaded from stock. If all three of the sizes were being used for bituminous work of some kind, the chances are that the stock stone, due to dust coating, would be unsatisfactory.

Demand Factor

The present accepted theory of crushing is the straight line formula. Stated briefly, the product of a crusher varies as a straight line from maximum to minimum. For any intermediate size the percentage of the product produced between the passing and the retaining screens, provided such screens were 100% efficient, is the difference between the percentage of material as shown on the theoretical graph between the passing and retaining screen. An actual test of this theory will be shown later in this report.



Theoretical set of specifications and how they are met by combination

Assuming this theory to be more or less correct, producers actually produce certain definite percentages of various sizes of stone in a certain fixed ratio. For example, assume that a certain producer actually screens his stone as follows: using 2½ in., 1½ in., 1 in., ¾ in., and ½ in. screens. From the straight line formula his output, theoretically, provided screens were 100% efficient, would be 2½ in. to 1½ in. (40%);

(Continued on page 78)

Radial Storage System

Hoist and Motor, With A-frame to Support Cable Pulley, Mounted on Truck

Operations were resumed this Spring by the Calvert Fuel and Supply Co., large building supply dealer of Detroit, Mich., in a bank sand and gravel deposit near Clarkston, Mich, which was worked by the company back in 1921. This concern had been purchasing aggregates for resale in the Detroit area, but is now producing its own washed and graded material in a new plant and shipping by rail into Detroit.

The plant features an open radial storage system which was designed by Fred T. Kern Co. of Milwaukee, Wis. Although the plant capacity is 600 tons of washed material in 9½ hr., the loading out capacity is considerably greater and large storage is provided to take care of winter shipments adequately when the plant is not in operation.

Two units comprise the plant: the scalping and crushing unit, and the sizing screen which is superimposed over the storage system. The scalping screen is a 40-in. by 18-ft. Telsmith trommel screen which operates in closed circuit through a bucket elevator with a Telsmith 3F gyratory crusher. A separation is made through 1½-in. circular openings and the oversize is crushed to 1½-in. minus.

Storage and Loading Provides Seven Adjustments

Minus 1½-in. gravel and sand through the screen openings are carried by a 20-in. belt conveyor, 130-ft. centers, to the screening plant over the storage system. Here four sizes of stone are graded and washed and the sand through the sand screen is flumed through a 10-in. pipe to a 7-ft. weight-actuated Telsmith sand settling tank. Sized stone is chuted into the proper storage compartments, two of which are provided for sand.

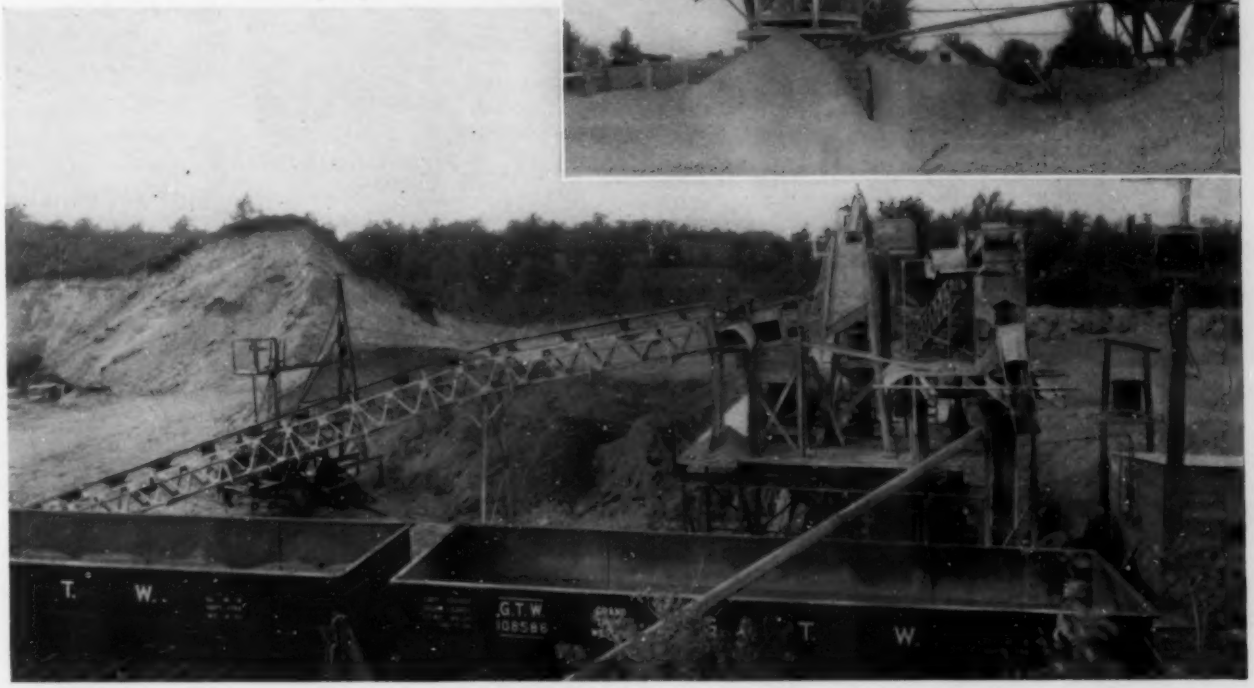
The Kern system provides a hexaganol-shaped, open vertical shaft in the center of the storage area, and facilities to reclaim any size of material, or blend, through gate openings in the bottom of the shaft onto a belt conveyor for direct carloading. In this particular plant there are seven adjustments, or settings, of the gate release from either stockpile, with control levers for their operation on the screening plant above.

Total free flowing, or live, storage is about 400 tons, but the system may be arranged for practically unlimited reclaimable dead storage, depending on the radius of land available for storage. This particular plant has been designed for a total of 25,000 tons of sand and gravel in storage.

Handling into dead storage from live storage and the reverse is done by means of a bottomless scraper bucket and cableway operated with a two-way drum hoist powered by a 20-hp. motor. The hoist and motor, with a steel A-frame supporting the cable pulley, are

Right: Radial storage system and screening plant with sand tank shown to the right

Below: Belt conveyor from feed hopper on left; scalping and loading-out plant, center; with screening plant directly back of scalping unit. Loading chute may be seen on the extreme right. Note deposit to the left, in the background



To the left is the belt conveyor to the screening plant; to the right is the tunnel belt conveyor for reclaiming aggregates for shipping

mounted on a counter-weighted White truck to make a mobile unit. The opposite pulley is free to rotate around the shaft ring at the screening plant, making it a matter of minutes to transfer operations from one stockpile to the other.

While the productive capacity of the plant is only about 65 tons per hour, the loading out capacity is 180 tons per hour. Reclaimed aggregates are carried over a 20-in. conveyor belt, 136-ft. centers, traveling at 330 f. p. m. to a loading chute at the railroad siding. In the inclined chute bottom, the gravel and sand are rinsed over Tyrod gravity screen cloth with ⅛-in. openings.

Deposit Characteristics

The deposit under excavation is a high gravel bank, containing about five percent plus 5½-in. stone, which is wasted. Overburden is a 3- to 18-in. thickness of clay which lays on the slopes of the hill and not in a horizontal plane. Excavation is done by a ¾-cu. yd. Thew gasoline shovel which undermines and caves the material from below. Some of the overburden is picked, but when heavy, the shovel loads it into trucks to be wasted.

Gravel and sand are hauled in Ford V-8 trucks, handling 4½ tons to the load, to a hopper close enough so that a single truck can make 120 to 140 loads per day. Plus 5½-in. stone is thrown out over a bar grizzley at the hopper and a reciprocating Telsmith feeder regulates the feed of material to a 20-in. belt conveyor, 80-ft. centers, which in turn feeds the revolving scalping screen.

Motor equipment includes: a single 50-hp. motor which drives the crusher and belt conveyor through a flat belt; each of the other three belt conveyors has a 25-hp. motor drive; the screens are connected to 7½-hp. motors; and a 10-hp. motor drives a 4-in. Allis-Chalmers wash water pump.

Natural Spring Supplies Wash Water

In excavating the site for the new plant, a crust of conglomerate was encountered at the exact center of the present storage system, and when it was broken through a natural supply of spring water sufficient for the washing plant requirements was made available. A cistern, 8-ft. square and 12-ft. deep, was dug, and the pump was placed directly under the washing plant in the reclaiming belt conveyor tunnel. About 350 g.p.m. is pumped to the washing screen.

Four men operate the plant and five are needed when production and reclaiming are done simultaneously. At present, all shipments are made on the Grand Trunk railroad, but eventually truck haulage will also be provided.

E. C. Calvert is president of Calvert Fuel and Supply Co. and Henry Zinger is treasurer. E. M. Calvert is in charge of plant operations.

Washing-Classifying Sand

(Continued from page 42)

the specific gravity, except that *A* has a value of 1, the specific gravity of water in that formula. In this case we think of the pulp as a mixture of dry sand, specific gravity 2.64, or *s*, and clayey water, specific gravity 1.023, which is *A*.

Substituting, we have,

$$\% = \frac{100 \times 2.64\ (1.77 - 1.023)}{1.77\ (2.64 - 1.023)}$$

Solving this gives 69.6 as the percentage of sand, so the clayey water is 30.4 percent. Of this, we know that 3.65% is clay, or 1.109% and 1.109 divided by 69.6 plus 1.109 gives 1.57 percent as the percentage of clay.

That the results of these methods do not exactly check is due to the fact that in some cases percentages of solids and in others specific gravities were used as a basis of computation. These do not correspond unless they are carried out to several decimal places. For example, the dilution of a pulp with 70 percent solids is not .428 as taken but .4285711 plus. And the corresponding specific gravity is not 1.77 as taken but 1.76728 plus. The differences being in hundredths of a percent may be neglected.

While computations can never take the place of actual testing, they provide information that is useful in showing where the testing shall begin and how far it shall be carried.

(To be continued)

Screening plant and storage on the left with belt conveyor feeding revolving screen above. Reclaiming conveyor may be seen to the right. In the foreground is a truck, equipped with A-frame and hoist, which is used in handling aggregates to and from dead storage

NATIONAL ASSOCIATION ACTIVITIES

Sand and Gravel

INTERPRETATIVE BULLETIN No. 11 issued by the Administrator of the Federal Wage and Hour Law has caused considerable perturbation in the sand and gravel industry. Executive Secretary V. P. Ahearn points out that this interpretation of the law holds that certain employes of sand and gravel companies using the navigable waters of the United States, either for production or transportation, or both, are subject to the Act, although it had been previously assumed that such employes were embraced by the exemption. The bulletin is in disagreement with the brief which was submitted to the Administrator of the Act on October 3, 1938, in behalf of all members of the industry who have occasion to use the navigable waters.

Following a conference of interested producers at association headquarters in Washington on May 5, a letter was addressed to Elmer F. Andrews, Administrator of the Act, registering the objection of the association to the interpretative bulletin from the standpoint of law as well as the standpoint of the inevitable practical results. Each producer affected by the ruling has been asked to submit his views to the association as to how the bulletin should be revised. The association has summarized Bulletin No. 11 as follows:

(*a*) An employe is employed as a seaman if his services are rendered primarily as an aid in the operation of a vessel as a means of transportation.

(*b*) The exemption extends to inland waters and coastwise vessels as well as to ocean-going vessels.

(*c*) Where the exemption is effective, it includes such employes as cooks, stewards, radio operators, pursers, and the like.

(*d*) If the service rendered by the employe is not in connection with transportation of the vessel, the exemption is not effective.

The sand and gravel industry is singled out in paragraph 5 by the statement that employes engaged in digging or processing of sand and gravel are not "seamen" within the meaning of the exemption.

(*e*) Employes on non-self-propelled barges "ordinarily" are not within the exemption. However, employes on seagoing barges working under seamen ratings are employed as seamen within the meaning of the exemption.

(*f*) Employes rendering watchmen services aboard a vessel laid up for a considerable period are not to be considered as seamen.

In the matter of irregular deliveries on contracts subject to the Walsh-Healey Act, a letter has been addressed to Executive Secretary Ahearn by Administrator Walling advising that in the case of spasmodic deliveries of sand and gravel, the work week of the contractor supplying sand and gravel to the government agency will be considered to begin on the day upon which work is commenced on the contract in the week of the spasmodic delivery; that is, the work week will commence in the case of spasmodic deliveries on the day upon which delivery is made in a given week unless the contracting party indicates the preference to have his regular work week followed. Separate records need not be kept, but the records must be kept in such a way as to indicate when deliveries are commenced and completed.

Coming Conventions

American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 26 to 30.

National Crushed Stone Association, directors' meeting, Westchester Country Club, Rye, N. Y., July 20.

National Ready Mixed Concrete Association, directors' meeting, Hotel New Yorker, New York City, June 6.

National Safety Congress and Exposition, Atlantic City, N. J., October 16 to 20.

National Sand and Gravel Association, directors' meeting, Palace Hotel, San Francisco, Calif., July 27 and 28.

Ready Mixed Concrete

EXECUTIVE SECRETARY V. P. AHEARN has called attention to the transfer of the Bureau of Public Roads from the Department of Agriculture to the newly created Federal Works Agency through the President's Reorganization order. Fears have been expressed that this transfer may result in a requirement that the Bureau give more emphasis to work relief than to a carefully engineered and long-term planned program of main trunk highways. There is no present danger of this situation, however, as the statutory time of the present Act will not expire until next year when Congress will have to appropriate Federal-aid highway funds for the years 1941 and 1942.

Although strong pressure has been brought to bear upon State legislatures to enact a model wage-and-hour law patterned after the Federal Act, which would close the gap created by the inability of the federal government to control intrastate commerce, it has not resulted in the passage of this legislation in any State. The bills have been definitely rejected in New Hampshire, New York, and Ohio. An amendment of the federal wage-and-hour law is now before the House which provides exemption from the hours provision for salaried employes paid $200 or more a month; provides that no liability or disability be imposed upon any person subject to the law for "any act done or omitted in good faith in conformity with any regulation or order of the Administrator," and permits the Administrator to approve employment in excess of the maximum hours prescribed where employes are paid a regular wage and where overtime hours are compensated for by time-off in subsequent weeks or during vacations with pay.

A.S.T.M. Program for Annual Meeting

MANY PAPERS of interest to rock products producers are on the program for the annual meeting of the American Society for Testing Materials to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 26 to June 30. At the Ceramic and Masonry Materials section meeting on June 29, Committee C-12 on Mortars for Unit Masonry, J. W. McBurney, chairman, will present new specifications for aggregate for ma-

(Continued on page 79)

Preventing Kiln Troubles By Finding Cause

Part 6. Concluding Article

By W. S. DICKIE*

Difficulties with the driving gear are few. In a great many cases they also are due to causes outside of the driving gear itself. On the gear ring, which is attached to the shell, only one instance of trouble has been encountered, and that is the opening of the joints between the halves or the quarters of the gear ring. It is unfortunate, of course, that the gear ring cannot be made a solid ring; but since it has to be made in segments, bolted together, there is the possibility that the joints may open. Some causes for open joints are: loose bolts at the joint; not enough bolts at the joint; lengthening of these bolts because they are not large enough; or too few bolts may attach the gear proper to its support. The use of fitted bolts in reamed holes at all points where bolts are used in the gear ring overcomes the difficulty encountered, although even then it is necessary to inspect the bolts periodically and be sure the nuts are pulled up tightly.

On the driving gear connecting the gear ring with the source of power there are a few troubles encountered, more with the older type of open driving gear than with the newer or enclosed type. On the older type of open driving gear, considerable difficulty was experienced with the breakage of shafts. This breakage was usually the result of one of two things; either the driving gear was poorly designed and allowed considerable vibration of the shafts, resulting in breakage, or vibration was permitted to get in the driving gear due to carelessness in keeping pedestals and other parts tight, both in themselves and in relation to the bedplate. Where the cause of breaking shafts was a matter of design,, of course, the cure is a change in design or possibly the use of alloy steel shafts. Where breakage is due to carelessness in keeping the parts tight, a periodical inspection and tightening up of the various parts will cure the trouble.

If gears and pinions are permitted to remain in service for too long a time, allowing too much back lash, a number of troubles may be encountered. Of course, these troubles can be cured by the installation of new sets of gears and pinions.

Another trouble met with in both old and new types of driving gear and sometimes attributed to something in the driving gear itself, is caused by the lack of care of the roller bearings. Trouble is experienced when the gear ring attached to the shell "bottoms" in the main pinion. This means that the outside of the teeth of one go all the way to the bottom of the space between teeth on the other. The cause of this is that the shell has been allowed to drop down because the adjusting screws were not pulled up to compensate for wear on the roller and tire faces. The cure, as is indicated just above, is the adjusting of the rollers to raise the shell with the girt gear away from the main pinion.

On the newer style of driving gear, provided the enclosed reducer on this new style is of the proper size, practically no difficulties are encountered. However, when a parallel shaft reducer is used on the shaft of a kiln with the new style of driving gear, the oiling system in the reducer should be arranged to operate on the pitch and the motor manufacturer should also be told that the motor will set on the pitch of the kiln so that he may have the opportunity of recommending ball bearings in the motor if he so elects. This also goes for any mechanical speed change which may be installed between the motor and the enclosed driving gear. It is understood in the latter case that it is imperative that ball bearings be used.

Reasons for "Jerky" Revolving Rotary Kilns

Below are given 22 reasons which have been discovered for irregular or jerky revolving of rotary kilns. These reasons have been given to a number of operators who have experienced this kind of trouble with their kilns, and the fact that their investigations of all cures given have not cured the difficulty in a few cases plainly indicates that there must be other reasons. Some of these reasons for jerky operation have been covered in previous articles, particularly those in connection with the alignment and adjustment of the supporting roller bearings. The 22 known reasons are as follows:

1. Imperfect or improper foundations, where the bedplate has not been set at right angles with the centerline of the kiln or parallel to the pitch of the kiln.

2. Improper alignment of bearing rollers with tires.

3. Meshing of the girt gear and main pinion too closely, causing the kiln to ride on the main pinion.

4. In the case of the use of the older or open type of driving gear, wear on either a washer or set screw collar on the drive shaft results in the bevel pinion's running in or out of mesh with the bevel gear.

5. Where a drum control is used, imperfect electrical connections to one or more of the fingers on the control will make and break the current at these fingers.

6. In some instances variable speed motors have been used, especially on installations where the proper speed of the kiln was not definitely known, and a very great range of speed was allowed for. Finally it was found that a very low speed was the proper one. At too low a speed, a variable speed motor will fluctuate its speed, transmitting these irregularities in speed to the shell.

7. If the joints in the girt gear are allowed to open, there is necessarily a change in the pitch of the teeth at the joints which will cause this trouble.

8. In the use of a rotary kiln on certain materials there is a disposition of the load in the shell to move with a rather jerky motion which will cause irregular movement.

9. A synchronization of several of the movements encountered in kiln operation, such as the falling of the load with the movement of point of deflection in the shell or with the pitch of the gear ring, may possibly cause the irregularity.

10. After gears and pinions have been used a considerable period of time, the wear on the teeth of these gears and pinions may cause an excessive back lash, especially if the movement of the load inside of the shell is a little peculiar.

11. Differences in temperature on the outside where the girt gear is exposed to the elements.

12. In addition to improper electrical connections in the drum control, improper connections on the leads to a motor regardless of type may cause the same making and breaking of the current and result in imperfect operation.

13. Sometimes owing to the warping or bowing of the shell, it rubs either on the hood or in the stack or dust settling chamber, and there may be irreg-

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ular revolving when the kiln is operated at fairly high speeds; but when the shell revolves slowly and the horsepower requirements are low, this is an even more definite cause of irregular revolving.

14. As might be expected, a badly warped or badly bowed kiln shell will cause the shell to revolve with a jerky motion.

15. In a few cases the kiln has been installed for a certain duty and a proper sized motor installed at the beginning of operation. At times it was later found that the kiln had greater capacity than was expected and in spite of this the motor was not replaced with a larger one. While there was difficulty in starting the kiln with a smaller motor, it seemed to turn it over after it was revolving, but not satisfactorily, because the kiln shell jumped in revolving.

16. Several cases were noted where flexible couplings, having had to absorb some misalignment for a long period, became very loose and transmitted this looseness as a jerky motion to the shell.

17. It seems that in kiln operation there is a speed which is critical and where, regardless of anything which might be done, the kiln revolves in an uneven manner. This is somewhat similar to experiences we have all had in connection with the critical speed in automobile motors.

18. The lubricant in the supporting bearings may be of too great a viscosity, this situation applies especially in slow moving kilns and on the older type of grease-lubricated bearings. When this condition exists, there is a drag in the rollers of the supporting bearings which is transmitted to the revolving of the shell.

19. Where a sealing ring on one or both ends of the kiln is installed, using the principle of two rubbing surfaces, there may be too much pressure between these rubbing surfaces, resulting in an added load on the motor and finally causing the irregular revolving.

20. In some of the older installations of kilns the main pinion was set directly under the centerline of the kiln shell and not more nearly under the center of the load. In some cases this has caused irregular revolving.

21. There are several designs of supporting bearings where the thrust washer installed for the purpose of taking the gravitational end thrust of the shell is not in the best position to receive its share of lubrication. If there is a lack of lubricant on the thrust washers, this can result in irregular movement.

22. In the operation of rotary kilns there is inherent vibration due to the revolving of the kiln which must be taken care of by some means or other. It is an established fact that the best way of doing this is by the use of enormous masses of concrete for foundations for the driving gear. In some cases the driving gear foundation is not made integral with the foundation for the adjacent roller bearings; in other cases, while it is joined to the roller bearing foundation, it is not made of sufficient size or strength to absorb properly this inherent vibration. Whenever this was observed, there was jerky operation as the kiln shell revolved.

The above 22 reasons are based on actual field instances of troubles encountered and cured. In a few cases they are probably inherent and will defy curing. As other cures for irregular revolving are discovered, it is the intention of the author to add them to the above 22 and pass them out, in the hope that better kiln operation will be obtained.

Care in Lubricating Bearings

Many times in the past we have all heard it said, "If we took as good care of our bodies as we do of our automobiles, there would be less need for doctors." This is as applicable to machinery as it is to the body. Because a rotary kiln is regarded as a "hulk of a machine," we are convinced that probably less care in starting and in maintenance is given it than to some other pieces of equipment and machinery in the same plant. Care, of course, should be taken in starting operation much in the way we break in our automobiles, except for not so long a period. With the newer type of bearings, a comparatively light lubricating oil should be used and the bearings should be run in without a load in the kiln. After the kiln has been revolved for a time without load or fire, it should be stopped, the light oil discarded, and the proper lubrication applied. Also with both this type and the older type of supporting bearings the lubricant should be cleaned out periodically, the bearings flushed, and new lubricant used. In one case and with the newer type of oil-lubricated bearings, the original lubricating oil was allowed to remain in the bearings for several years. Of course, new oil was added as required but the old oil was not flushed out. Eventually the need for doing this was shown by the fact that the bushings and thrust discs wore exceedingly fast.

Many instances have been seen where some difficulty in kiln operation seems to befuddle those in charge. This usually results in something being done in a great hurry and in many, many cases it is entirely the wrong thing to do. It is unquestionably better, even when breakage occurs, to sit down and study the situation to determine, if possible, the cause for the difficulty or breakage. And above all, an effort should be made to cure the cause and not the effect.

(The End)

Suspended Flume Used to Eliminate Excess Fines

(Continued from page 37)

Each flume is 22 in. wide on the upstream end, 20 in. wide on the downstream, and 16 in. deep. At the joints the flumes are telescoped and held together by a chain five inches long with a lag screw in each flume section placed two inches from the bottom, so that the flumes can work either up or down but cannot pull apart.

On the wide end and bottom of each flume, a 3-in. channel iron was placed, extending 4 in. out on each side with a 15-in. eye bolt threaded for 12 in. These eye bolts turn through a nut welded on the bottom of the channel, and have a swivel placed on the eye end of the bolt, which allows a 12-in. adjustment at each one of the points.

Supporting cables have spacer bars with U bolts to hold the hanger cables separated the correct distance for the even distribution of the load. The hanger cables are fastened around the supporting cables above the spacer bars to hold them in place. Every other pair of the hanger cables is crossed, which equalizes the load on the supporting cables as the water and waste material does not flow through the flume uniformly, but surges from one side to the other.

This flume carries the discharge from a 10-in. Amsco pump, using a 10-in. suction line and an 8-in. discharge line. Under load, it is designed to adjust itself so that the flow line will be on a five percent grade, and the speed of the water and material passing through it is approximately 8 ft. per second.

In Fig. 1, by placing a straight edge along the under side of the flume, it will be noticed that a convex arc is formed. Under observation, when the load is turned into it, the flume adjusts itself to the grade which is required to carry and discharge its load.

After all the virgin material has been pumped from the down stream side of the plant and it is necessary to move the barge to the opposite side of the river, it is planned to abandon the flume, and the supporting cables will be used to carry the discharge line over the river to the barge, thereby eliminating a costly pontoon line.

The excess fines and waste water will then be diverted to the original flume as shown in the extreme left of Fig. 1 and on the right in Fig. 5, and the pumped out area will be back-filled with waste sand.

All steelwork and fastenings were furnished by the Topeka Foundry and Iron Works, Topeka, Kansas. All construction work was under the supervision of Joe L. Roe, plant superintendent and Charles Mayo, carpenter foreman of the Victory Sand and Stone Co.

Ferric Oxide In Cement

Developing New "Titrating Mixtures For Determination of Ferric Oxide Content

Part 2

By A. J. JOHNSON* and J. T. LYNN*

In Part I of this article, the use of diphenylamine as an indicator in the dichromate titration of ferrous oxide for determination of ferric oxide in portland cement was described. Part II, the concluding installment, will describe the use of other more reliable indicators.

Barium Diphenylamine Sulfonate

The National Bureau of Standards sample No. 27-B (Sibley iron ore) was used as a standard.

Various weights of samples were dissolved in concentrated hydrochloric acid with the aid of stannous chloride solution. An amount of acid was used to combine with the iron and to make the solution approximately one normal in free hydrochloric acid on completion of the titration. The reduction of stannous chloride, and cooling were performed in the same manner as when using diphenylamine. In order to keep the volume small, 10 ml. of mercuric chloride were added to each sample and the solution was stirred until the excess stannous chloride was completely oxidized. A "titrating mixture" was prepared by diluting 450 ml. phosphoric acid (syrupy 85 percent) to one liter with distilled water. An amount of this titrating mixture was added to give approximately 10 percent, by volume, of the titrating mixture on completion of the titration. At least two determinations were made for each weight of sample chosen. In most cases different amounts of indicator were used on duplicate determinations. In all cases correction was made for the indicator used. These corrections were based on the data given by Sarver and Kolthoff.[9] The data are listed in Table No. V.

TABLE V. STANDARDIZATION OF $K_2Cr_2O_7$ SOLUTION WITH SIBLEY IRON ORE USING BARIUM DIPHENYLAMINE SULFONATE AS INDICATOR

Weight Sample Taken (Grams)	Weight Fe_2O_3 Taken (Grams)	Ml. $K_2Cr_2O_7$ for Titration	Indicator Correction	Ml. $K_2Cr_2O_7$ for Fe_2O_3	Fe_2O_3 Equivalent of $K_2Cr_2O_7$ Solution, (gms. Fe_2O_3/ml. $K_2Cr_2O_7$)
0.0273	0.0266	10.75	—0.12	10.63	0.002502
0.0273	0.0266	10.73	—0.12	10.61	0.002507
0.0273	0.0266	10.70	—0.06	10.64	0.002500
0.0273	0.0266	10.67	—0.06	10.61	0.002507
0.0273	0.0266	10.69	—0.06	10.63	0.002502
0.0359	0.0350	14.07	—0.06	14.01	0.002498
0.0359	0.0350	14.07	—0.06	14.01	0.002498
0.0487	0.0475	18.99	—0.06	18.93	0.002509
0.0487	0.0475	19.04	—0.03	19.01	0.002499
0.0615	0.0600	23.98	—0.12	23.86	0.002515
0.0615	0.0600	24.10	—0.03	24.07	0.002493
0.0846	0.0825	33.09	—0.12	32.97	0.002502
0.0846	0.0825	33.01	—0.03	32.98	0.002502
0.1076	0.1050	41.98	—0.12	41.86	0.002508
0.1076	0.1050	41.80	—0.06	41.74	0.002515
0.1230	0.1200	47.90	—0.12	47.78	0.002512
0.1230	0.1200	47.82	—0.06	47.76	0.002513
0.1948	0.1900	75.81	—0.12	75.69	0.002510
0.1948	0.1900	75.80	—0.06	75.74	0.002509
				Avg.	0.002506

The ferric oxide content was determined on the Lehigh Standard Cement Sample using the average value (Table No. V) found, with Sibley iron ore, for the strength of the dichromate solution. The data are listed in Table VI.

TABLE VI. STANDARDIZATION OF LEHIGH STANDARD CEMENT SAMPLE WITH $K_2Cr_2O_7$ Solution (1 ml. = 0.002506 grams Fe_2O_3)

Weight of Sample	Ml. $K_2Cr_2O_7$ for Titration	Indicator Correction	Ml. $K_2Cr_2O_7$ for Fe_2O_3	Per Cent Fe_2O_3 in Sample
1.000 gram	10.81	—0.12	10.69	2.68
1.000 gram	10.80	—0.06	10.74	2.69
1.000 gram	10.79	—0.03	10.76	2.70
			Avg.	2.69

TABLE VII. STANDARDIZATION OF $K_2Cr_2O_7$ SOLUTION WITH LEHIGH STANDARD (Lehigh Standard = 2.69% Fe_2O_3)

Weight Sample Taken (Grams)	Weight Fe_2O_3 Taken (Grams)	Ml. $K_2Cr_2O_7$ for Titration	Indicator Correction	Ml. $K_2Cr_2O_7$ for Fe_2O_3	Fe_2O_3 Equivalent of $K_2Cr_2O_7$ Solution (Gms. Fe_2O_3/ml. $K_2Cr_2O_7$)
.4461	.0120	4.90	—0.06	4.84	0.002479
.4461	.0120	4.90	—0.06	4.84	0.002479
.2230	.0060	2.55	—0.06	2.49	0.002410
.2230	.0060	2.52	—0.06	2.46	0.002439
.1115	.0030	1.29	—0.06	1.23	0.002439
.1115	.0030	1.29	—0.06	1.23	0.002439

Further "standardization" determinations were made on the potassium dichromate solution, using portions of the Lehigh Standard Sample as a source of ferric oxide. The same considerations were observed for concentration of hydrochloric and phosphoric acid as for the Sibley iron ore determinations. These data are found in Table No. VII. The data of Tables No. V and No. VII are plotted in Fig. 1.

Barium diphenylamine sulfonate (0.158 grams per 100 ml. water) solution was used as the indicator in all the above tests. One drop of indicator solution was considered to require 0.015 ml. potassium dichromate solution to be oxidized to the colored form. A 50 ml. volume burette was used throughout this series.

Sodium Diphenylbenzidine Sulfonate Indicator

Tests were made with Sibley iron ore and Lehigh standard sample as described above except that a 0.1 percent solution of sodium diphenylbenzidine sulfonate[10] was used as an indicator. The method of making the titration was modified as follows: The dichromate solution was added from a weight burette until a few drops from the end point and the titration completed with a dichromate solution which had been diluted to exactly one-tenth strength and which was added from a volume burette. The weight figures were converted to volume figures to facilitate comparison with data obtained on other indicators. Weights of dichromate used were corrected to "in vacuo." The density of the dichromate solution was assumed to be the same as water for the purpose of these calculations. The data are listed in Table VIII. Only one determination was made for each weight of sample. The indicator correction was neglected. The data of Tables V, VII and VIII are plotted in Fig. 1.

Table IX has been calculated from

*Lehigh Portland Cement Company.

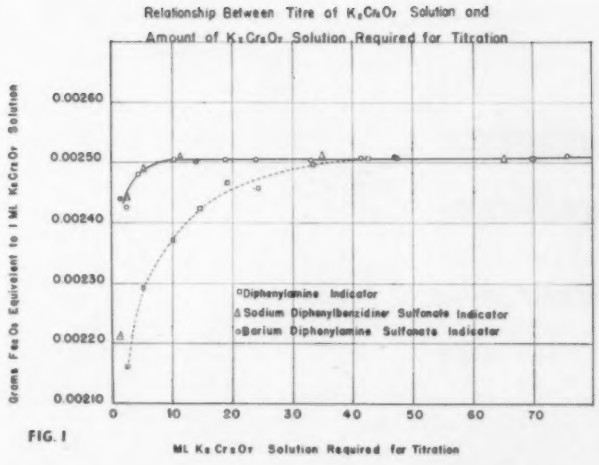


FIG. 1

Tables V and VII to show the error that may be expected, using the proposed method for cements and acid soluble materials. The figures in the right hand column would be in per cent ferric oxide if a 1-gram sample of material containing the amount of ferric oxide indicated in the left hand column were taken for analysis.

Discussion of Results Obtained With the Three Indicators

Since a fair degree of reproducibility on the same sample by the same analyst is obtainable with diphenylamine, diphenylamine sulfonic acid, and diphenylbenzidine sulfonic acid, it was considered that the relationship between ml. of dichromate used and the ferric oxide equivalent of the dichromate solution would be a good basis for comparison of the indicators.

An inspection of Fig. 1 shows little choice between sodium diphenylbenzidine sulfonate and barium diphenylamine sulfonate in respect to constancy of titre for various amounts of iron titrated. Both are much superior in this respect to diphenylamine. The change in titre for small amounts of iron is not due to the "drop error" as might have been suspected when using the 50 ml. volume burette. The use of the weight burette in conjunction with a volume burette containing a much diluted solution virtually eliminates the "drop error." Kolthoff[11] states that more than the theoretical amount of dichromate is necessary to oxidize the iron in solutions 0.01 normal and less, the deviation increasing with the dilution. We believe that this is the probable explanation of the change in titre in this case.

From the standpoint of distinctness of end point barium diphenylamine sulfonate is much superior to sodium diphenylbenzidine sulfonate, with diphenylamine a poor third.

From the standpoint of accuracy and reproducibility, there is little to choose from between barium diphenylamine sulfonate and sodium diphenylbenzidine sulfonate.

The chief disadvantage of barium diphenylamine sulfonate is an appreciable indicator correction, but, if the same amount of indicator is used each time, neglect of the indicator correction introduces a small error within the limits of error inherent in the determination and of no considerable consequence in the analysis of portland cement.

In view of the above considerations, we consider the use of barium diphenylamine sulfonate as the most practical indicator for the determination of ferric oxide in portland cement.

In addition to increasing the accuracy of the determination, barium diphenylamine sulfonate indicator is soluble in water rathar than concentrated sulfuric acid. No titrating mixture requiring the mixing of sulfuric acid and water is necessary. The phosphoric acid may be diluted to any desired concentration with no special precautions. The end point is such that it may be approached rapidly without danger of over titration when using the proposed method. The use of this method in several laboratories of the Lehigh Portland Cement Co. has met with the unqualified approval of the men who perform the analytical control work.

Over the ordinary range of ferric oxide content found in portland cements the error occasioned by neglecting the indicator correction is small and of the magnitude that seems inherent in the determination (Table IX). The proposed method for cements neglects this correction and assumes standardization within the range that is expected. For materials outside the range 0.5 percent ferric oxide—20.00 percent ferric oxide, it is expected that the analyst will take the indicator correction into account or vary the weight of sample to bring the titration within the desired range.

TABLE VIII. RELATIONSHIP BETWEEN TITRE OF $K_2Cr_2O_7$ SOLUTION AND AMOUNT OF $K_2Cr_2O_7$ SOLUTION REQUIRED FOR TITRATION USING SODIUM DIPHENYLBENZIDINE SULFONATE AS INDICATOR. INDICATOR CORRECTION NEGLECTED

Weight of Sample Taken (Grams)	Weight of Fe_2O_3 Taken (Grams)	Ml. $K_2Cr_2O_7$ for Titration (No Correction for Indicator)	Grams Fe_2O_3 Equivalent to 1 ml. $K_2Cr_2O_7$ Solution
0.0892 (c)	0.0024	1.085	0.002212
0.2230 (c)	0.0060	2.458	0.002441
0.5000 (c)	0.0134	5.403	0.002480
0.02831 (o)	0.02762	11.02	0.002506
0.08975 (o)	0.08756	34.87	0.002511
0.16695 (o)	0.16288	65.09	0.002502

Above data plotted in Fig. 1.

(c) Sample of cement. Lehigh Standard Sample, Fe_2O_3 = 2.69 percent.

(o) Sample of Sibley Iron Ore. U. S. Bureau of Standards Standard Sample No. 27B.

TABLE IX
ERROR IN FERRIC OXIDE DETERMINATION

Fe_2O_3 Taken (Centigrams)	Fe_2O_3 Found (Centigrams)	Error (Centigrams)
0.30	0.31	+0.01
0.30	0.31	+0.01
0.60	0.62	+0.02
0.60	0.62	+0.02
1.20	1.21	+0.01
1.20	1.21	+0.01
2.66	2.66	0.00
2.66	2.66	0.00
2.66	2.67	+0.01
2.66	2.66	0.00
2.66	2.66	0.00
3.50	3.51	+0.01
3.50	3.51	+0.01
4.75	4.74	—0.01
4.75	4.76	+0.01
6.00	5.98	—0.02
6.00	6.03	+0.03
8.25	8.26	+0.01
8.25	8.26	+0.01
10.50	10.49	—0.01
10.50	10.46	—0.04
12.00	11.97	—0.03
12.00	11.97	—0.03
19.00	18.97	—0.03
19.00	18.98	—0.02

Average error, single determination..0.015
Maximum error, single determination.. 0.04

The Proposed Method and the Reagents

Stannous Chloride Solution: Dissolve 2 grams of the crystallized salt in four times its weight of a mixture of three parts of water and one of hydrochloric acid (sp. gr. 1.19). Add scraps of iron-free granulated tin and boil until the solution is clear. Keep the solution in a closed dropping bottle containing metallic tin.

Mercuric Chloride Solution: Saturated solution. Dissolve about 70 grams of mercuric chloride in one liter of hot distilled water. Let cool to room temperature and pour off clear liquid.

Potassium Dichromate Solution: Dissolve 1.5375 grams of potassium dichromate per liter of solution.

Titrating Solution: 450 ml. phosphoric acid (syrupy-85 percent) diluted to one liter with distilled water.

Indicator Solution: Dissolve 0.158 grams barium diphenylamine sulfonate in 100 ml. water.

(Continued on page 78)

Fundamental Mechanics of Calcination, Hydration

Part 2. Methods of Testing for Lime Availability

By VICTOR J. AZBE*

In testing we have the gravimetric, the modified Scaife or the sugar methods, which reveal the amount of lime available. Then we have the loss on ignition method that reveals the amount of CO_2 still remaining in the lime. We also have the acid treatment with gas evolution and absorption methods.

They all will show different results and the available CaO will always be lower, and often much lower than the amount calculated from remaining CO_2. This lost CaO could well amount to 10 percent, or even more of the total CaO. It is lime produced by heating, but it is of little or no value, and as it is rather elusive, it could well be called CaO-X.

Burned lime may be divided into three general groups: one the perfectly burned but extremely rare type, having the very highest available CaO content. To one side of this would be a group embracing the under-burned limes; to the other, the group of over-burned limes. Both of these would be of low available CaO, each for an entirely different reason.

The under-burned lime was partially studied in a plant where there was such a shortage of kiln capacity and where lime was in such demand, that kilns were always overdrawn, regardless of the very large amount of core that was obtained. This lime was then sent through rotary slakers to obtain milk of lime, and the residue through rotary screens from which the larger cores were returned to the kiln and the smaller portions discarded as waste.

A rather carefully secured, composite sample of the kiln draw was obtained, covering an extended period, and analyzed, the results of which follow:

	Percentage
CaO	55.20
CaO-X	4.93
$CaCO_3$	34.38
Inert	5.49
Total	100.00

CaO-X percentage of total CaO, 8.05

However, laboratory results and plant performance may be at variance. In the laboratory testing conditions are ideal and plant performance cannot well approach them. For this reason during the period covered by the above composite lime analysis a lime balance was run at the plant with the following results:

	Percentage
CaO (Sugar)	54.98
CaO-X	8.12
$CaCO_3$	32.76
Inert	4.14
Total	100.00

CaO-X percentage of total CaO, 12.75

It will be noted that over 12 percent of the CaO was unavailable to the system. The question is—why? Overburning could not possibly have been responsible as there was too great core content to allow any contention that sintering temperatures had developed. The time was also lacking since the stone and lime were passing through the kiln rather rapidly. The sole explanation is occlusion of CaO by $CaCO_3$, most likely formed by recarbonation $CaCO_3$.

LIME FORUM

Mr. Azbe is a contributing and consulting Editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

Any CaO particle will readily convert to hydrate if water or steam can find access to it. The fact that there is unavailable CaO means merely that it is occluded, or surrounded by something impervious to water. Evidently, as the CaO-X failed to combine, it must have been occluded so water could not penetrate into it. Not all $CaCO_3$ crystals dissociate equally readily. It may be

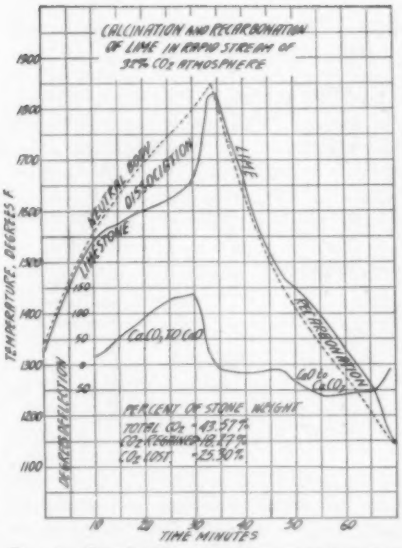


Fig. 1: Graph showing how recarbonation takes place as soon as CO_2 can find access

that lime formed along preferential channels and CO_2 escaped under pressure, which pressure is not available to water and which was not able to penetrate to the CaO. It may be said that such unavailable CaO is isolated by more difficulty dissociated $CaCO_3$ masses and is accessible only through channels too difficult for water readily to penetrate. The other and more likely explanation is recarbonation. The inside mass is hot, $CaCO_3$ dissociates, CO_2 passes outwards, but the outside mass may have cooled, so this CO_2 combines with the CaO. As the $CaCO_3$ particle is bulkier than the CaO, the channel becomes blocked and other CaO cells remaining become unavailable because access of water is prevented by the blocking caused by the recarbonated particles.

Limestone above dissociation temperatures, except when in form of calcite crystals, gives up CO_2 very readily, but immediately below this temperature it takes it on, fully as readily, the whole being in perfect balance, governed by the CO_2 tension. If temperature is lowered below that of equilibrium and any CO_2 is present, the oxide will absorb it and become reconverted to $CaCO_3$. Contrary to the opinion of some, at high temperature recarbonation is readily possible without the presence of any water vapor.

Fig. 1 shows how readily recarbonation takes place, as soon as CO_2 can find access. In the space of 20 minutes 42 percent of CO_2 driven off while heating, was reabsorbed while cooling, and the lime that was still left lost its tendency towards slaking due to occlusion

* From a paper presented before the recent Lime Symposium in Columbus, Ohio, held under the auspices of the A.S.T.M.

of the remaining CaO by the recarbonated particles. Pieces from these experiments had been laying in the laboratory, some for years, with nothing further happening to them than if they had been a solid piece of limestone.

It is also known that much of CaO in wall mortar refuses to recarbonate even after a hundred years of exposure. In a similar manner CaO in the lime refused to hydrate. The answer in both cases is occlusion by the recarbonated particles.

Limestone Dissociation

Limestone dissociation is governed by CO_2 tension exactly comparable to evaporation of water, the rate of which is governed by vapor tension. The surface of limestone will begin to dissociate at fairly low temperatures when the surrounding atmosphere is air. This same surface exposed to the kiln atmosphere of around 35 percent CO_2 dissociates at about 1520 deg. F. If the surrounding gas is all CO_2 at atmospheric temperature, the dissociation temperature is 1646 deg. F. While a lump of lime is calcined immense volumes of CO_2 are given off which have to seep out through sub-microscopic-sized pores. Great internal pressures may therefore be built up, which in turn raise the dissociation temperatures possibly by several hundred degrees.

This condition is a disadvantage because a higher outside temperature is necessary to make heat to flow inwardly, which tends to reduce capacity or cause an increase of core.

Through an increase of external temperature, the surface of the lime may be slightly overburned before the internal regions are fully calcined. This external overburning causes shrinkage and makes escape of CO_2 even more difficult.

If this lime is removed from the hot zone into the cooler while still containing core, due to higher temperatures inside, CO_2 is given off for a long time and, passing outwards, is reabsorbed as soon as it reaches those regions where temperature and pressure are favorable. The larger the lump, the greater the rate of calcination, the higher the internal pressure will be, and therefore both the external and internal temperatures will be higher. The high external temperature will overburn the lime to a certain extent before the core is all gone, and the high internal temperature will cause CO_2 to come off for a long time after the lime passes into the cooler, which will disseminate itself causing recarbonation of some CaO and occlusion of other and so very seriously lower the available CaO.

In the effort to help visualize the states of soft, medium and dead burned lime, Fig. 2, diagrams, A, B, C and D are presented. Although they are drawn to an approximate scale of one in a hundred million, they are not entirely speculative. The arrangements and dimensions were actually determined through the aid of short-wave X-Rays. Of course, the atoms are not solid masses as pictured; these bodies just represent space that is under atomic influence, that is, covered by the electronic orbits of the respective atoms, but that in effect is the same thing.

(A) is the classic structure of a calcium carbonate unit cell with some of the neighboring members. The cell takes the rhombohedral form characteristic of calcite. Whether or not the limestone appears crystalline fundamentally it is so. The CO_3 radical alternates with the Ca atom in a series of long continuous chains.

(B) shows the section after calcining at the minimum of temperature for the minimum of time. The calcium atoms still occupy approximately the same position, the CO_2 molecule has left, and only one oxygen atom remains which has shifted over to form the calcium oxide molecule.

It will be noted that lime in this form presents a very open structure, the CO_2 molecule shown in the upper and the water molecule shown in the lower portion can re-enter or leave the structure freely and their combination with CaO depends solely upon the respective tensions corresponding to temperature.

The state is virtually amorphous, the old rhombohedral unit has disappeared, and the natural tendency is to form the dense cubic cell of calcium oxide.

(C) presents one of the transition stages, in bulk we would call it hard-burned lime. All of the members shifted closer together in the direction that eventually would make up the unit cube of CaO.

In both cases of lime, if the CO_2 would re-enter the structure at the entrance points of the clear channels between the chains of oxide atoms, there would be an expansion and closing off of access to anything beyond. Water then could not enter and the long line of CaO atoms would, through the action of a comparatively few CO_2 atoms, become unavailable.

(D) shows the final, the dead-burned state of CaO: a dense cubic crystal that nothing can penetrate either way. The action here can only be surface action, and even that may not take place as the surface will most likely be glazed by the slags of lime combined with impurities that formed and spread while the lime was at the high temperature that brought it to this dead-burned state.

In practice, we may have all of these combined not only in different lumps of lime coming from the kiln but even in the very same lump when conditions are at their worst. All this is an argument for burning of small stone that more readily is heated and more readily cooled. At the very least, it is an argument for uniform-sized stone; for control over the kiln draw; for uniform temperatures; for quick cooling of the lime, and also for as frequent drawing of kilns as possible consistent with proper trimming.

(To be continued)

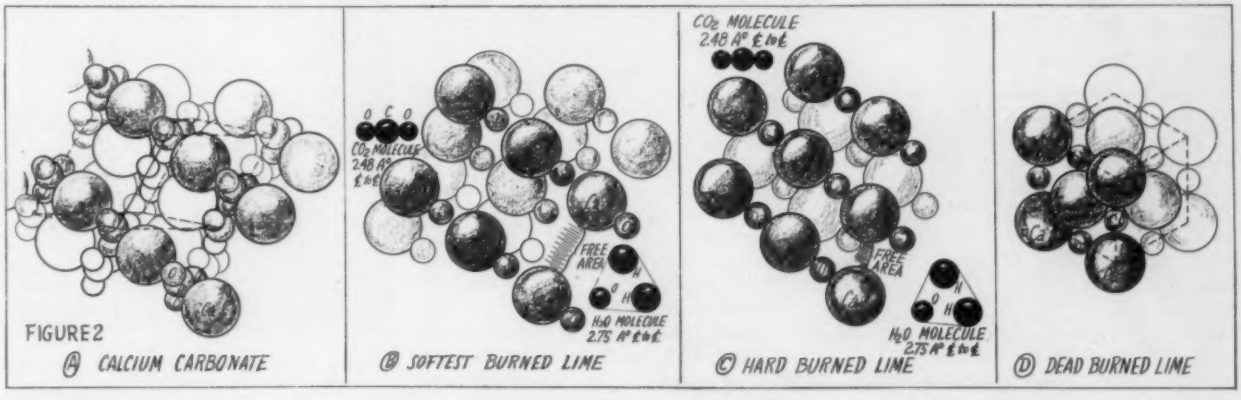


FIGURE 2

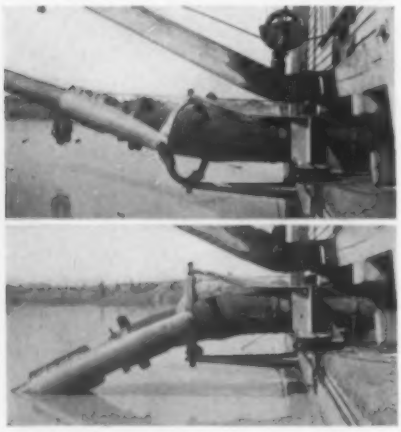
(A) CALCIUM CARBONATE (B) SOFTEST BURNED LIME (C) HARD BURNED LIME (D) DEAD BURNED LIME

HINTS AND HELPS for Superintendents

Universal Joint for Dredge Suction Hose

By JOHN A. BUECHLER,
Supt., Monroe Sand & Gravel Co.,
Monroe, La.

A LIFE-SAVER for suction hose is shown in the illustrations. This universal joint, designed for use with any size suction hose, takes the strain off the hose itself, reducing wear and abrasion to a minimum. Formerly it was necessary to replace the 10-in. by 8-ft. suction hose every month, but since the universal joint has been applied it does



Above: Suction hose, equipped with universal joint, shown in raised position. Below: Suction hose in lowered position

not require replacement but once a year. In one case, a 12-in. hose equipped with a universal joint lasted three years.

How to Bend Pipe

By W. F. SCHAPHORST

A QUESTION often asked is: "What is the best way to bend pipe?" By way of reply, the following experience will probably be of interest:

To bend large pipes, fill with dry sand and plug the ends. Heat to a red heat in the area to be bent and then bend. Be sure that the sand is dry. Where bends are slight, it is often unnecessary to use sand or resin. The object of sand or resin is simply to keep the sides of the pipe from collapsing, or to prevent reduction of flow area. If wet sand is used, and if the ends are plugged, the pipe may burst when heated, due to the steam pressure generated.

Instead of sand, resin is good. There is, however, a "right way" and possibly several wrong ways to use resin. An example of a wrong way was recently brought to my attention where the mechanic filled the pipe with resin, plugged the ends, and heated the pipe at the place where he wanted to bend it. He watched for a "red heat" just as he would had he filled the pipe with sand. The result was—a violent explosion.

To use resin correctly, pour it into the pipe and allow it to cool and harden. As soon as the resin is hard, bend the pipe cold. Don't heat it. Then after the pipe is bent, heat the pipe all over sufficiently to melt and remove the resin.

Equal results may be secured by using lead instead of resin. On cold days in the far North they sometimes fill the pipe with water and let it freeze, and then bend the pipe. It sounds plausible, but care must be exercised there on account of the expansion of water when it freezes.

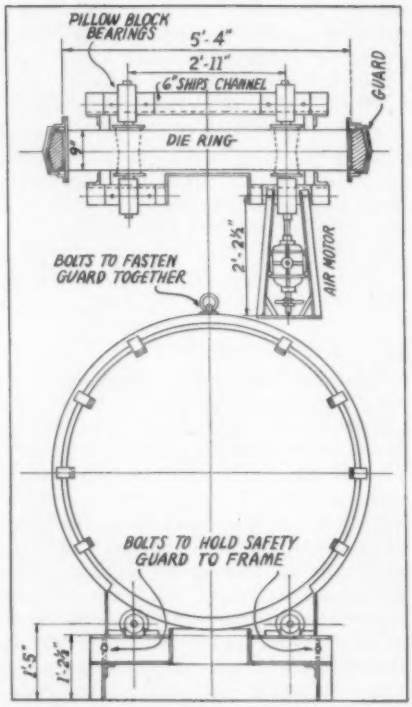
Many excellent mechanical devices are on the market for bending pipe.

Welding Device with Safety Guard

AT ONE OF THE PORTLAND CEMENT MILLS in the Lehigh Valley, an interesting machine is being used for turning the die ring of a Hercules mill while being "stellited" in the company's shop. The machine was developed to facilitate turning the ring in a vertical plane while being treated and consists of two rollers over which the ring is turned, with the power furnished by an air motor.

Owing to the expansion which necessarily takes place during the process of welding, breakage is likely to occur, and in fact at one time the ring broke in half, so a safety attachment was devised to protect the operator from falling pieces of metal.

The guard, of steel, consists of a series of regularly-spaced straps placed across the outer and inner surfaces of the ring. The other straps are welded to



Details of safety guard and roller used in welding die ring of mill

two circular rings, one on each side of the die ring edge, and the straps on the under side or inner side of the ring are bolted so the guard can be taken off. The device is simple but is positive protection against injury to the operator from falling pieces of the die ring.

Building up worn die ring of Hercules mill by welding

Keeping Concrete Units Clean in Yard Storage

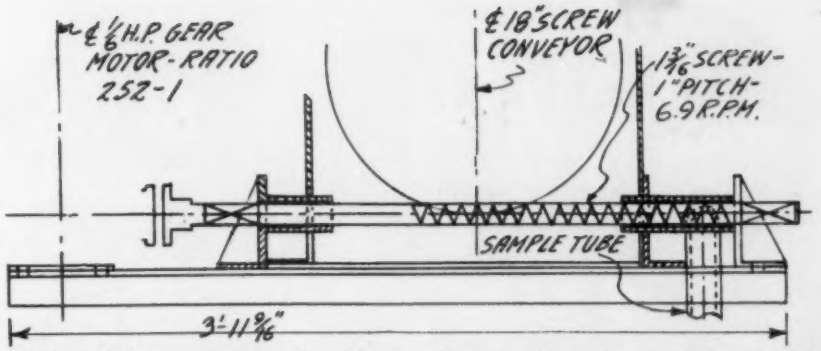
NASHVILLE BREEKO BLOCK AND TILE CO., Nashville, Tenn., during the recent high stage of the Cumberland river, which borders its plant, built an emergency flood wall. The wall was constructed of five rows of 12- x 24-in. Breeko cinder units extending around the entire yard storage, a distance of 400 ft. It was built 5 ft. high, just enough to keep the muddy flood waters from coming over its top.

This wall was not built to keep water out of the yard, since it was of porous construction, but to filter out mud and debris which would coat the stockpiles and require considerable expense in cleaning the block. According to reports, the wall served its purpose well and its cost was paid for many times over by eliminating the necessity for cleaning up blocks in the yard. At the time of the flood about 100,000 units were in the stockpiles. The wall, which is double in construction, will remain in place for future emergencies, and additional courses will be laid in the event flood waters reach higher than the 1939 level.

Continuous Cement Sampler Requires No Attention

UNIVERSAL ATLAS CEMENT CO. has developed a continuous cement sampler that operates satisfactorily and without attention. The diagram shows details of one in operation at the Hudson, N. Y., plant. This particular one is incorporated into an 18-in. cement screw conveyor.

The sampler is nothing more than a short cross screw conveyor which extends upwards into the bottom of the main screw conveyor housing to sufficient height to skim off a small representative sample. The main screw conveyor blades are cut to give needed clearance. According to checks on the efficiency of the apparatus, the constant mixing action within the conveyor does prevent segregation and the sample taken is very accurate. About a quart of material is skimmed off per hour into a container.

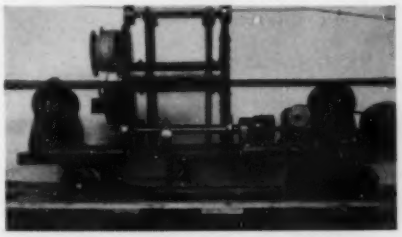


Details of continuous cement sampler which comprises a short cross screw conveyor extending upward into the bottom of the main screw conveyor housing

Reconditioning Electric Cables

By E. M. DIEHL
Chief Electrician,
Keystone Portland Cement Co.,
Bath, Penn.

DAMAGED or worn coverings on electric cables may be reclaimed for further use by repairing them with the device shown herewith. Several hundred feet of various sizes of three-conductor cable were re-covered at a fraction of the cost of new cables. The device will wind on two or more kinds of insulating tape and a wire or twine covering or will do both in one operation.



Portable winder used in repairing damaged electrical conductors

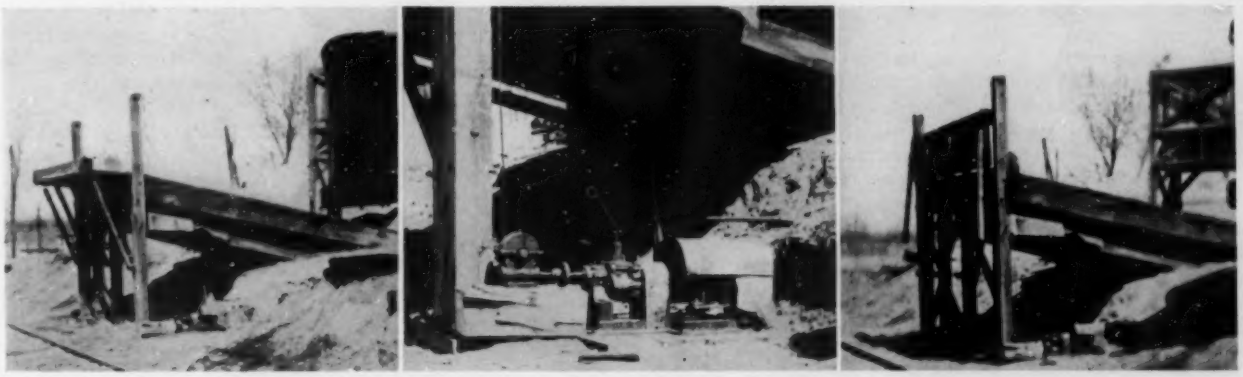
One of the principal features of this device is that it is not necessary to take a cable out of service for reconditioning. The winding cylinder is of two-piece construction, and by removing one of the pieces the cable undergoing repairs can be placed in position. As the material is being wound around the cable, the machine slowly moves along propelled by the same motor which turns the winding cylinder.

Car-Loading Ramp With Hinged Extension

By H. L. SULLIVAN
Supt., Sangravl Co.,
Paducah, Ky.

RAISING and lowering of the apron which extends out from the car-loading ramp over the car has been made an easy job with the arrangement shown in the illustrations. The apron has to be raised when not in use to maintain a proper clearance between the tracks and the ramp.

Originally, the apron was moved up and down with a hand winch, a slow and tiring job. With the use of the power unit, it is just a matter of shifting to proper gear and throwing in the switch. The cost of setting it up was less than $10 since most of the parts were available. It comprises a 5-hp. motor, an old automobile transmission, and a small worm gear coupled to a cross shaft around which the lifting or supporting cables are wound.



Left: Car-loading ramp apron in lowered position. Center: Motor and transmission unit. Right: Apron in raised position

NEWS about People

EARLE GARDNER, safety engineer of the Consolidated Rock Products Co., Los Angeles, Calif., has been made secretary of the company, succeeding Robert Mitchell who was recently elected president.

•

WALLACE L. CALDWELL, president of the Alabama Asphaltic Limestone Co., Birmingham, Ala., has been appointed a member of the National Association of Manufacturers' committee on patents and trade-marks.

•

ARTHUR ROEDER, New York, N. Y., and H. Lee Mason, Jr., Pittsburgh, Penn., are the new directors recently elected to the board of the Alpha Portland Cement Co., Easton, Penn.

•

C. BOETTCHER, president of the Ideal Cement Co., Denver, Colo., has advised that he will take over for the time being the duties of general manager which were formerly in charge of the late R. J. Morse.

•

N. D. BRAGG of McCrady-Rogers Co., Pittsburgh, Penn., is chairman of the Building Material and Construction group meetings of the National Association of Credit Men convention to be held in Grand Rapids, Mich., June 11 to 15.

•

S. L. CRIBARI, assistant treasurer, Marquette Cement Manufacturing Co., Chicago, is chairman of the central cement group meeting, National Association of Credit Men convention, and W. W. Jenkins is chairman of the eastern group.

•

T. E. O'CONNOR, treasurer of the Universal Atlas Cement Co., New York, N. Y., has announced the following appointments to assistant treasurer: C. A. Keeley, who has been made assistant treasurer at New York, started with the company in 1920 and was successively promoted to western credit manager, cashier and assistant to treasurer and now assistant treasurer. He is a graduate in commerce from the University of Wisconsin. D. V. Johnson, who will be located at Pittsburgh, Penn., served several railroads and was with the Illinois Steel Warehouse Co. and Illinois Steel Co., before he became connected with the cement company in 1928. J. Purdy, with headquarters at Birmingham, studied business administration with the Alexander Hamilton Institute and the National Association of Credit Men, of which he is a member. He began work with the cement company in 1923 where he has served in various capacities from stenographer to assistant credit manager. K. S. Bates, with offices at Kansas City, is a graduate of the University of Chicago where he received a Bachelor of Philosophy degree in general business administration.

•

E. L. DAVIS was recently elected a director of the Union Lime Co., Inc., Republic, Wash., in the reorganization of the company in April. Details concerning this reorganization and the new officers appeared in ROCK PRODUCTS, May, 1939, p. 66.

•

F. C. BOWEN, enterprising general manager of the Asphalt Vault Co., Inc., Atlanta, Ga., shown here, is new in the concrete products industry and deserves a hand for the diligent way in which he has gone about to produce a quality product in concrete. Many others with more years of experience could surely profit by adhering to a similar policy. A graduate of Georgia Tech, in architectural engineering, Mr. Bowen's previous experience had been in the contracting and undertaking businesses. And when he does find time to relax you'll more than likely find him deep sea fishing on the Gulf. He's a producer in this too—we've heard reports.

F. C. Bowen, general manager of the Asphalt Vault Co., Inc., Atlanta, Ga., performing a moisture determination test on sand in his laboratory

•

H. N. SNYDER, vice-president of the Federal Portland Cement Co., Buffalo, N. Y., has been appointed a member of the National Association of Manufacturers' committee on industrial practices.

•

L. S. FISHER, president and general manager of the Camargo Sand and Gravel Co., Woodward, Okla., is convalescing after a severe illness.

•

FRANK P. HOOVER, who was office traffic manager for the Monarch Cement Co., Humboldt, Kans., for 17 years and was later transferred to the Tulsa office, has succeeded the late George P. Gosch in the Wichita office of the company.

•

DANIEL HARRINGTON, chief of the Health and Safety Branch of the Bureau of Mines, was reëlected chairman of the Mining Standardization Correlating Committee. This committee is in charge of the American Standards Association mining standards program.

•

DONALD DRUMMOND has been placed in charge of sales of the carbon dioxide and gypsum products divisions of the Mathieson Alkali Works, New York, N. Y. Charles H. Larson has been promoted to manager of the consignment department, succeeding De Witt Thompson, who was recently made assistant general manager of sales.

•

W. J. STEWART, sales manager of the Stewart Sand and Material Co., Kansas City, Mo., was recently elected president of the Sales Executives Bureau of the Kansas City Chamber of Commerce.

•

FRANK B. WARREN, vice-president in charge of sales, has been elected to the board of the Bessemer Limestone & Cement Co., Youngstown, Ohio. He succeeds William R. Daly of Otis & Co., Cleveland, who declined renomination.

•

GUY W. JORDAN, chemist with the Southern States Portland Cement Co., Rockmart, Ga., was recently elected president of the Rockmart Rotary Club.

•

GEORGE ROLLNICK has been made purchasing agent for the Consolidated Rock Products Co., Los Angeles, Calif. He was formerly office manager.

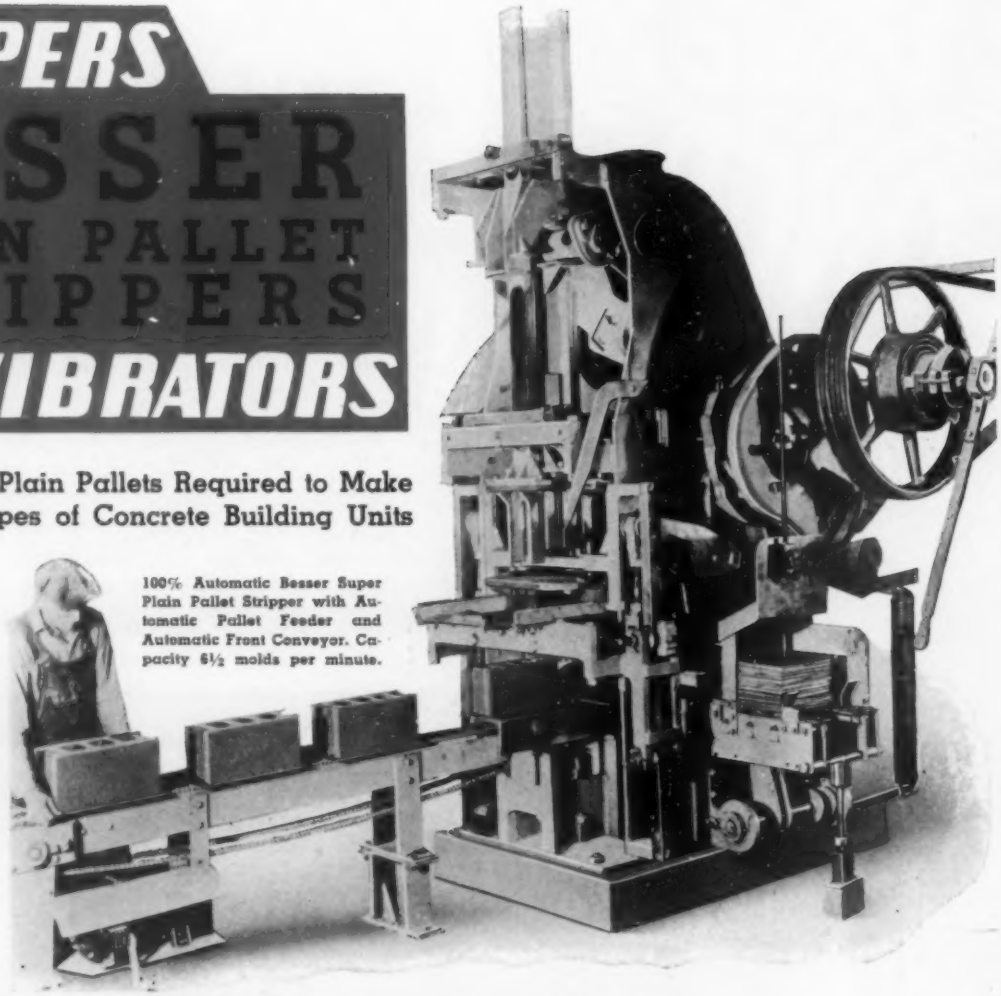
CONCRETE PRODUCTS AND CEMENT PRODUCTS

Florida Uses Concrete Tile Roofing

New concrete home features white tiles furnished by Miami Roofing Tile Co.

TAMPERS
BESSER
PLAIN PALLET STRIPPERS
VIBRATORS

Only One Set of Plain Pallets Required to Make All Sizes and Types of Concrete Building Units



100% Automatic Besser Super Plain Pallet Stripper with Automatic Pallet Feeder and Automatic Front Conveyor. Capacity 6½ molds per minute.

"I wish I had all the money I have spent for pallets before putting in a Besser Plain Pallet Stripper. I would not need to work any more." —Fred Bennett, Cleveland, Ohio.

Besser Multi-Mold Hand Operated Plain Pallet Stripper. Capacity 250 to 350 molds per day.

BESSER PLAIN PALLET STRIPPERS

TAMPER STRIPPERS

Besser Super Automatic Plain Pallet Stripper—Daily Capacity 3000 to 4000

Besser Victory Automatic Plain Pallet Stripper—Daily Capacity 2000 to 2500

Besser Semi-Automatic Plain Pallet Stripper—Daily Capacity 1200 to 1500

Besser Champion Power Operated Plain Pallet Stripper—Daily Capacity 1000 to 1200

Besser Multi-Mold Hand Operated Plain Pallet Stripper—Daily Capacity 250 to 350

BESSER VIBRAPAC PLAIN PALLET STRIPPERS

Besser Automatic Vibrapac Plain Pallet Stripper—Daily Capacity 4000 to 5000

Besser Power Operated Vibrapac Plain Pallet Stripper—Daily Capacity 200 to 2500

BESSER-FLAM VIBRATOR

Besser-Flam Plain Pallet Vibrator—Daily Capacity 800

West of Rockies address inquiries about this machine to:
STEPHEN FLAM, SHERMAN OAKS, CALIF.

Besser Champion Power Operated Plain Pallet Stripper. Capacity 1000 to 1200 per day.

Ask for Folder "21" Advantages of Plain Pallets. Write today for details and prices. State daily production and sizes you want.

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL

206 39TH STREET *ALPENA, MICHIGAN*

THE SAVING IN PALLET COST WILL PAY FOR A BESSER PLAIN PALLET STRIPPER!

Advertising Builds Up A Ready-Mixed Business

By NATHAN C. ROCKWOOD

Left: John Murphy, Sr., president. Above: Left to right, H. D. Sullivan, vice-president and general manager; John Murphy, Jr., secretary

Eight years without a competitor, and a steady growth of business, is the record of the Central Pre-Mix Concrete Co., Spokane, Wash. Advertising has been the biggest factor in each instance, for through advertising not only has ready mix concrete become known and used locally, but so much prestige has been built up for this particular firm's ready-mixed concrete that a new competitor would have hard sledding—and that's one of the primary advantages of advertising often overlooked.

The Central Pre-Mix Concrete Co. puts aside 8c of every cubic yard of concrete sold for its advertising budget; and with 4c of this it hires an advertising agency—the Tomowske Advertising Agency—to write copy and pick the newspaper space. Considering the amount of space that can be bought under this budget, apparently an excellent job has been done. Some samples of the advertising were shown on p. 93 of the January issue of ROCK PRODUCTS; some more are shown herewith.

The advertising is consistent and is timed to appear from about the last of August to the middle of November—this being the period when most of the construction is conceived and contracts let. The advertisements appear on the building pages of the Saturday afternoon daily, and the Sunday newspapers. In spite of the small space used, attention is directed to it by frequent use of reverse plates (white letters on black background), and each ad is designed to put over one idea or one thought. These little messages are for three fairly specific purposes: (1) To build up goodwill with architects and builders by boosting the value of their services to the public; (2) by emphasizing that ready-mixed concrete is the *new and modern* way to get concrete; (3) reason why copy, stressing the virtues of ready-mixed concrete, with never any comparisons or disparagement of competition.

Concrete block plant is located on top of the rocky hill and the ready mixed concrete plant has been built into the side of the hill. Aggregates are received on the upper level, either by rail or truck

In addition to the prospects developed by inquiries as a result of these advertisements the building permits are closely followed, of course, as by all other building material salesmen. This company uses a double-postcard, with prepaid (Business Reply type) half on which the signer asks for a "free estimate offer."

Developing Quality Concrete

In order to have a quality product to sell, Herb Sullivan, sales manager of the company, went to Grand Coulee dam (about 100 miles west) and took "a short course", so to speak, under O. G. Patch, engineer of materials, and concrete specialist for the U. S. Reclamation Service. Mr. Sullivan freely acknowledges his indebtedness to Mr. Patch for instructing him on the fine points of the fineness modulus theory and how to estimate and apply it. Returning to Spokane, Mr. Sullivan bought himself a set of Tyler testing sieves and proceeded to find the fineness modulus of local sands. He found,

Designed by Robert Charles Martin

Another big development scores a smash hit with Concrete

Joshua M. Holmes, Jr., builder and developer, and Heyer-Kemner, Inc., realtors, used firesafe concrete to put over Fox Chase Manor

JUST outside Philadelphia is Fox Chase Manor, another residential development which has cashed in on the appeal of better construction and the growing popularity of concrete.

A Cape Cod demonstration home, completed last September, brought 52 sales before the year was out . . . and 100 more homes are planned for this year. Base price of the house with lot, including full basement, was $4,225. And concrete was featured.

What About Your Community? In scores of instances, concrete products manufacturers have demonstrated the wisdom of getting an architect to create a satisfying design . . . of tieing up with a builder or realtor in building a demonstration home . . . and then winning people to the beauty, economy, firesafety and other advantages of concrete in a vigorous sales and advertising campaign.

Can Home Buyers Find You? Yes!—if you display truck and job signs; advertise in phone books, newspapers, by mail or radio; if you have live-wire salesmen to follow up the leads developed by the Association's national advertising that is reaching the best prospects in your town.

This promises to be a banner year in residence volume for concrete product firms and concrete house builders who make this local tie-up.

PORTLAND CEMENT ASSOCIATION
Dept. A6-45, 33 West Grand Ave., Chicago, Illinois

LOOK at the Record Production of this KENT-ROOT VIBRA PRESS

If you want low-cost, high quality production, be sure to send for complete details about the Kent-Root Vibra-Press today.

This single machine has produced more than 2,000,000 units, operating day after day with only one operator and one offbearer and with no delays due to failure of the machine. Six blocks per minute—every one of uniform density throughout with clean-cut surfaces of excellent texture.

Look at these outstanding features:

VIBRATION in the full-floating mold box insulated from the machine proper prevents destructive mechanical vibration and crystallization of any machine members, and produces blocks of uniform density.

TRAVELING APRON produces clean-cut surfaces.

PRESSING ACTION completes the machine-like precision of each block.

FLEXIBILITY permits making of units from 3 to 16 inches wide in any length up to 24 inches, and in any height up to 12 inches.

CHANGE OF EQUIPMENT for various sizes made in less than twenty minutes.

The KENT MACHINE CO.
CUYAHOGA FALLS, OHIO

"COMMERCIAL" CORED *Steel* PALLETS

For economical production.

Strong and light, but will not crack or bend.

No excess steel to lift. Easy on offbearers. Less weight and more blocks on the rack cars.

Fit low cost block machines.

Perfect for the new vibrators.

Cores speed up curing, air circulates freely.

Ask your machinery dealer

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

as is the case in many localities, that sand producers were not putting in the necessary fines to provide a sand with 2.76 to 2.86 fineness modulus. But, where there's a market (and more than one producer) there is usually a way, so it wasn't long before he got the kind of sand he was looking for.

By splitting the sand as received on the 48-mesh sieve, and using 15 to 30 percent of the minus 48-mesh with 70 to 85 percent plus 48-mesh, the desired fineness modulus of 2.76 to 2.86 is obtained. Sieve tests are made at least once a day. Two sizes of sand are received at the plant separately, the fine sand will pass 14-mesh about 95 percent and 48-mesh 70 percent. The amount used, of course, will depend on the amount of minus 48-mesh in the coarser minus ¼-in. sand.

Three sizes of gravel are used, 2½-in., 1½-in., and for floors and thin slabs ¾-in. Ordinarily, the 2½ and 1½ are blended. However, it has been found that accurate blending of the fine aggregate is far more important than close blending of the coarse aggregate.

Small Mixer Big Output

Through a 28-cu. ft. (1-cu. yd.) Rex plant mixer as many as 60 batches an hour have been run. This is, however, used only as a shrink mixer, for the real mixing is done in the truck mixers, four Jaegers and four Rex on International and Kenworth chasses.

Prices (in the summer of 1938) ranged from $7.80 retail delivered for

Rubber-tired portable ramp with hopper to receive discharge from mixer truck

batches under 15 cu. yd. and $7.45 in larger batches, of 4-sack, 1:3:5 mix, to $6.15 for 3½-sack concrete as a special offer to new home builders. The 3½-sack concrete tested around 2000 lb. per sq. in. and the law requires 1500 lb. for foundation work, etc., where this is used. Obviously, only by using a fine ground cement and a fine aggregate with plenty of fines is such a strength possible with so lean a mix. The price to contractors on standard 4-sack concrete mixes averages 80c per cu. yd. less than to retail consumers.

One of the various devices which has made it possible to economize in delivery costs is a lightweight, rubber-tired ramp, which can be readily towed behind a mixer truck. This permits dumping the load at a sufficient elevation for a hopper or receptacle to be placed to receive it. This hopper, which is attached to the ramp, holds a truck load of concrete which can be served out as needed for the job, without detaining the truck. Service to the contractor is placed above all other considerations.

The plant also makes and sells concrete blocks. These are advertised as a part of the regular newspaper campaign, and also in local agricultural papers. The facilities for making the block include a new Stearns Stripper, with an 18-cu. ft. mixer and a 30-hp. Scotch marine boiler, with an automatic stoker for steam curing. Blocks are made with the same crew when the ready-mix business is slack.

The plant is located on "Gibraltar Rock," a prominent feature of the landscape, close to downtown Spokane. The block plant is on top of the rock and ready-mix plant built into the side of the rock. Aggregates are delivered by truck or rail by means of a long grade.

W. M. Murphy, Sr., is president of the Central Pre-Mix Concrete Co., his son, John W., is secretary-treasurer and Herb D. Sullivan is vice-president and manager.

Another Concrete Silo Stave Factory

THE INTERLOCKING STAVE SILO CO., Wichita, Kans., will build a concrete silo stave factory at Boonville, Mo., which will be housed in its own building, 30- x 48 ft., with concrete runways to the curing and storage yard. This is the fourth plant built by this company, the others being located at Wichita and Topeka, Kans., and Enid, Okla. The decision to locate at Boonville was actuated by the fact that the supply of sand is plentiful and there is a good marketing territory surrounding the plant.

Burial Vault Company In New Quarters

REINHARDT BURIAL VAULT CO., St. Louis, Mo., has moved to 2819 N. Spring Ave., and is now housed in a modern, brick building. The plant will be equipped with power hoist and overhead tracks for loading and stock piling finished vaults. The company also will have a fine display room.

The Reinhardt name has been associated with this company for 41 years. Walter F. Jones, the present owner, bought out Walter S. Wessel on April 1 of this year. He had been with the company before Mr. Wessel purchased it and remained with Mr. Wessel while it was in his hands. Out of Mr. Jones' many years' experience, he has developed a new type top sealed vault which is heavily reinforced to bear up any earth load that may occur.

BUY CONCRETE the Modern Way... DELIVERED READY-MIXED
Better, cheaper, quicker. No muss, no cleaning up. Delivered any time, anywhere. SERVICE is the middle name of the
Central Pre-Mix Concrete Co.
N805 Division Broad. 2158
Uniformity Guaranteed
FOR HOME BUILDING and REMODELING
Ready-Mixed Concrete
One Yard or 1000
Mixed by Standard Specifications
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Saves Usual Cleaning-up Troubles
Ready-Mixed Concrete is made from clean, graded materials ONLY. No guesswork. All sand and gravel are weighed . . . all water and cement are measured. To insure quality, we use the finest materials available.
Use Ready-Mixed Concrete for—
Garage Floors
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Anything Worth Building Deserves Good Concrete
A $10,000 home isn't worth 10c if a poor foundation allows it to collapse. Play safe—insist on Pre-Mix concrete.
Estimates—Ideas
are yours by calling Broadway 2158. Ready-Mixed is the most economical way to buy concrete—let an estimate will prove. Orders can be filled in 20 minutes.
Central Pre-Mix Concrete Co.
By Gibraltar Rock
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Quality Builders Use
READY-MIXED CONCRETE
The Sign of
BETTER HOMES
Forewarned is forearmed. If you're buying, ask if Central Pre-Mix Concrete was used. It adds life and value to property.
If you're building, find out about the differences in concrete, and why Central Pre-Mix is superior. Better mixed of better materials by experts, it won't crack, crumble or leak. For estimates or information, see your architect, contractor, or the
Central Pre-Mix Concrete Co.
N805 Division Broadway 2158

Typical samples of newspaper advertising used to promote the sale of ready mixed concrete

Meeting Demands of a Large Housing Market

By RALPH S. TORGERSON

Not every concrete products manufacturer is in a position to meet the varying demands of a large housing market such as the Chicago metropolitan area. It requires a plant and yard storage capacity sufficiently large to guarantee prompt and regular deliveries of different block sizes for large apartment house projects, involving more than 100,000 units per structure, or it may be a residential subdivision of homes of ashlar and other designs calling for a number of different size units.

The Chicago Insulcrete Co., located in Franklin Park, Ill., a suburb adjoining the big city to the west and centrally located for deliveries, is one of the companies which is adequately set up to serve this market. Plant facilities are so arranged that materials and products from rail siding to yard storage move with a minimum of lost motion.

Aggregates are received on the north side of the plant in railroad hopper cars and dumped over a steel grid-covered concrete pit below the track. An 18-in. Link-Belt drag conveyor, 18-ft. centers, moves the material into the building and discharges to the boot of a bucket elevator, 68-ft. centers, which carries the aggregate to the top of a large steel bin divided into two compartments, each of which holds 100 cu. yd. A split spout permits the diversion of aggregates from one bin to the other.

Bags of cement received in box cars are quickly elevated to the storage room on the mixer floor by means of a unique chain elevator to which there has been attached curved steel plates bent outward at the bottom to hold conveniently a bag of cement. Over this elevator and projecting out from the roof line of the building is a portico which permits unloading of cement in rainy weather.

At present practically all block are made with Waylite aggregate which is obtained in two sizes; a coarse grade, ¼-in. to ½-in.; and a fine grade, ¼-in. to dust. Other concrete block are made, using crushed stone screenings for aggregate. Cinder block are no longer made due to the difficulty of obtaining regular deliveries of a desirable quality of cinders.

A very convenient method is used in making concrete batches for the concrete block and brick machines. As shown in one of the illustrations, it will be noted that heavy structural steel members support the large two-compartment bin for aggregates in the tower-like portion of the building. Directly below the aggregate bin, each compartment holding equal amounts of fine and coarse aggregate, is a traveling batch buggy moving on rails the entire length of the building. This batch buggy, which has a capacity of 20 cu. ft. of fine and coarse aggregates, discharges its contents to mixers on the platform or balcony floor above the three block machines and the brick machine.

On the main floor, in line, are a new No. 9 Stearns Joltcrete, a small Anchor machine for odd sizes, a brick machine, and an Anchor power stripper. The Joltcrete has a capacity of nine block a minute, the brick machine will produce 9000 brick in an 8-hr. day, and the Anchor power stripper, with two men, has a capacity of 1800 block in 8 hrs.

Each Mixer Has Its Own Water Tank

There are three concrete mixers; two Ideal type of 21 cu. ft. capacity, and a Blystone of 10-cu. ft. capacity. One of the Ideal mixers serves the Stearns Joltcrete and the other is movable on rails and provides concrete for either the brick machine or the smaller Anchor machine. The Blystone mixer is stationary and located over a hopper feeding the Anchor power stripper. Each mixer has its own measuring water tank with a water glass calibrated in gallons so that the operator may carefully measure out the required water per mix by means of easily reached valves.

At the extreme end of the room housing the block machines is an emery wheel saw for cutting blocks into unusual shapes for window framing openings, etc., where the quantity does not warrant setting up the small block machine for odd sizes.

Each mixer and each block machine has its own electric motor to prevent any possibility of a shutdown of the entire production line should trouble develop with the line shafting. The illustration still shows the line shafting in place but it is not used except for operation of the emery wheel saw. Empty cement bags are cleaned in a drum-shaped beater machine.

In addition to concrete block and brick, the company makes concrete lintels, which are cast in molds. All lintels are reinforced with steel rods, with two on top and two on the bottom side. Up to 4 ft. in length, ½-in. rod is used, and over 4 ft., a ¾-in. reinforcing rod is employed.

(Continued on page 66)

Typical of the concrete block houses built in a Chicago suburb with the units laid up in ashlar pattern. Blocks furnished by Chicago Insulcrete Co.

Fig. 1: Aggregates are received in hopper cars and dumped over a hopper at the bottom of which is a drag conveyor for moving the material to the boot of an elevator which conveys it to the steel bin in the tower. Cement is elevated to mixing floor in bags by means of chain conveyor attached to wall. Fig. 2: Two-compartment aggregates bin and batch buggy shown to the upper left. Fig. 3: Battery of four block and brick machines. Fig. 4: Curing kilns with canvas covers raised. Fig. 5: Part of large storage yard with electric lift truck in center. Fig. 6: Two of three Ford trucks used to haul concrete units

All "green" block and brick coming from the machine are placed in racks and removed to a battery of nine steam curing rooms by means of an Elwell-Parker electric truck where they are subjected to a hot, humid atmosphere for 24 hrs. Each room holds approximately 1800 blocks. Regular cement is used for the mix, except in winter when high early strength is used to speed up the curing process.

In addition to the more or less standard block, 8- x 8- x 16-in., 4- x 8- x 16-in., and 8- x 12- x 16-in.; different sizes are made for broken ashlar patterns. The concrete brick made with Waylite aggregate are the standard 2¼- x 4- x 8-in. units.

Yard storage is available for 120,000 concrete blocks. Concrete pavements, extending from the kiln room, make it easy to handle block to the yard by means of the electric truck. Three brightly painted Ford V-8 trucks with platform bodies are used in making deliveries.

Henry Buchholtz is manager of the Chicago Insulcrete Co., and has taken an active part in promoting the use of concrete products in the Chicago area. He has worked closely with architects and building contractors to secure the maximum utility and beauty of structure from the use of concrete units as attested by the building illustrated.

New Concrete Pipe Plant at Gulfport, Miss.

MISSISSIPPI CONCRETE PIPE CORP., Gulfport, La., planned to start operations in its new plant early in May. It is reported that the buildings and machinery cost $65,000, according to C. M. Williams, president of the company. K. B. McCracken is vice-president. The plant comprises a machine room, 40- x 50-ft., and a curing room, 40- x 100-ft. It is understood that the Mississippi Concrete Pipe Co. is a subsidiary of the Louisiana Materials Corp.

Cast Stone Meeting at Carthage, Mo.

NUCARTH STONE CO., Carthage, Mo., was host to a regional meeting of cast stone producers held at the Drake Hotel on April 10, according to Luke Boggess, president. C. G. Walker, executive secretary of the Cast Stone Institute, Chicago, Ill., attended the meeting, which was well represented from the territory.

Concrete Pipe Defendants Acquitted

A NEW YORK SUPREME COURT jury at Buffalo, N. Y., recently acquitted five corporations and two individuals of conspiracy to defraud the city in concrete sewer pipe sales. Defendants included Earl J. Sherwood, president, and Melvin C. Kelly, vice-president, Great Lakes Concrete Pipe Co; the company; the District Improvement Corp.; the Universal Concrete Pipe Co., Inc., Rochester, and the New York Concrete Pipe Co., Inc., Warsaw.

Mortar Colorings for Concrete Bricks

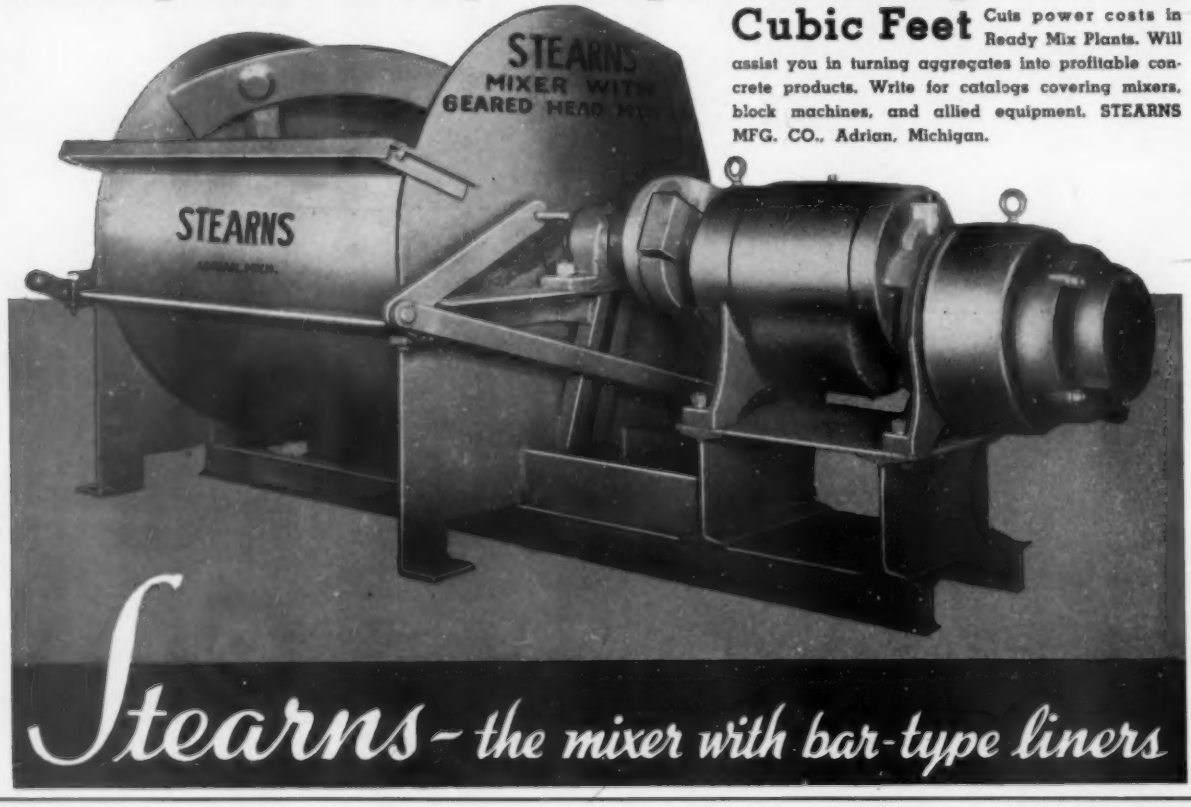
RICHLAND DUNBRIK CO., Columbia, S. C., has tripled its production since it started operations only a year ago, according to Walton Greever, president of the company. C. E. Newman is in charge of the plant and F. P. Ferrell handles sales. Experiments have been made with mortar colorings made by Riverton Lime & Stone Co., Riverton, Va.

Block Factory for Steamboat Springs, Colo.

PAUL BERSHERS and HIRAM PARKER have organized a concrete block manufacturing business at Steamboat Springs, Colo., and have set up a plant. A Flam vibrating block machine is to be used in making cinder concrete blocks and bricks. To cure the products, a steam heated kiln is being erected.

Prompt Delivery – Capacities up to 42 Cubic Feet

Cuts power costs in Ready Mix Plants. Will assist you in turning aggregates into profitable concrete products. Write for catalogs covering mixers, block machines, and allied equipment. STEARNS MFG. CO., Adrian, Michigan.



Stearns – the mixer with bar-type liners

Public Must Be "Sold" On Concrete Burial Vaults

1940 Convention of N.C.B.V.A. to Meet in Cincinnati, Ohio

Increasing interest by burial vault manufacturers in the newer methods of processing concrete for their particular product was evidenced by the large attendance at the annual convention of the National Burial Vault Association in Pittsburgh, May 9 and 10. The registration far exceeded that of any previous convention. President Harold E. Coburn called the meeting to order.

New Officers

At a spirited election under the new constitution's procedure three new directors were named to fill expiring terms: G. H. Blackstone, Zanesville, Ohio, J. S. Hamilton, Pittsburgh, Penn., and F. L. Mathies, New Haven, Conn. J. S. Hamilton was elected president; F. L. Mathies was elected vice-president, and R. W. Mead was re-elected secretary and treasurer. The election took place on the morning of Tuesday May 9. The expertness with which the Convention committee had arranged the schedule was made evident very early, for immediately after the election the audience was escorted to the Grant street entrance of the William Penn. The lady guests were loaded into buses provided by the convention committee for a sightseeing trip to the outlying districts of Pittsburgh, and then to the Webster Hall, where both delegates and ladies had a specially prepared lunch.

During the luncheon the guests were addressed by Dr. E. R. Weidlein of Mellon Institute. His address related the trials and vexations experienced by those who founded the institute.

After lunch the men were conducted to Mellon Institute, and the ladies were divided into groups, some going to the Mellon Institute, some to Heinz Memorial, others to the Stephen C. Foster Memorial, and others to the Carnegie Museum and Art Gallery. Each group was escorted by a guide, thoughtfully selected by the committee, capable of giving information upon the subjects selected.

At the demonstration given for the men at the Mellon Institute, the visitors were divided into groups, each under the direction of a guide who explained the various exhibits and processes. All groups came together in the audience room, where they were addressed by Dean Hubbell.

Mellon Institute Demonstration

Formerly concrete was treated as concrete without regard to uses and the vault manufacturer was forced to glean from the methods of contractors of buildings, dams, and tunnels what little he could to apply to his own line of manufacture. Today, however, engineers and scientists have come to realize the particular scope within which the concrete burial vault manufacturer must operate. Exhibits at the Mellon Institute, together with the lectures and demonstrations, had been grouped for this particular purpose.

Various ways of treating cement, its improved methods of manufacture, and the difference in manufacturing methods were clearly shown. The various uses of aggregates and the sizes which were to be combined for most efficient burial protection were discussed.

At the banquet in the evening, 146 were in attendance, the largest number on record. The entertainment features of the banquet will long live in the memory of those attending.

The Wednesday program was rearranged to permit J. F. Harrigan, representative of the Fair Labor Practice Commission, to address the convention. On Monday the NCBVA Board invited Mr. Harrigan to attend their morning meeting so that the members might outline to him the problems of the industry and inform him of how its service at the cemetery extends into extra hours without any actual labor being performed, and these idle extra hours, which cannot be remedied, often result in over-time. It was explained that the idle time, plus the one and a half pay for over-time, entailed a hardship upon the industry which could not be absorbed either by the factory or those purchasing the vault in these times of severe economic pressure. Mr. Harrigan appeared before the convention on Wednesday morning and outlined briefly the method under which the industry and the Fair Labor Standards, Regulatory Commission might cooperate.

J. S. Hamilton, president, National Concrete Burial Vault Association

The next address was by G. H. Blackstone, whose subject was advertising. He covered every field of publicity that may be used with ethical concrete burial vault progressive sales' methods. Mr. Blackstone most forcibly presented the necessity of service, and pointed out that concrete burial vaults have often made headway against severe competition by a superior service at the cemetery. He spoke of the inability of the concrete burial vault manufacturer as well as manufacturers of all other classes of funeral merchandise to have properly made articles appreciated by the general public. The general public cannot be led to interest themselves in affairs funereal or be induced to inform themselves as they do of other articles, such as autos, radios, refrigerators, and many other items of general household use. He pointed out that this lackadaisical attitude on the part of the public was a temptation to many to manufacture inferior products. A poor vault, whether it be made of concrete or of any other material, might be embellished with exterior finishes to attract the eye.

Question-and-Answer Meeting

A question-and-answer period followed under the direction of Paul M. Woodworth of the Portland Cement Association. This proved a most interesting session and moments of merriment were thrust in.

Following the luncheon, the convention listened attentively to a very able address by Louis Beinhauer, president of the Allegheny County Funeral Directors' Association.

L. K. Huber, chairman of the 1940 Convention City committee made his report after reading the invitations from the various cities seeking the next convention. Representatives of numerous cities made appeals. Cincinnati was selected as the 1940 convention city.

J. M. Chandler, president and general manager, Chandler Materials Co., Tulsa, Okla.

C. W. Chandler, secretary-treasurer, of the Chandler Materials Co.

From Quarry and Pit to Finished Products

Chandler Materials Co. Diversifies Production

An illustration of the growing tendency among aggregate companies to become processors of finished products as well as producers of raw materials is the story of the progress made by Chandler Materials Co., Tulsa, Okla.

Twenty years ago the present owners acquired the properties of the Price Sand Co. and the OK Sand Co., located on the Arkansas river, near Tulsa. Later, these same men added the Oklahoma Cement Pipe Co. and The Hughes Stone Co. Prior to July, 1937, these companies were separate corporations, but in that year they were all merged into the Chandler Materials Co., with J. M. Chandler as president and general manager; T. R. Dean as vice-president; and C. W. Chandler, as secretary and treasurer. Today, the company produces sand and gravel, crushed stone, concrete pipe, ready-mixed concrete through a subsidiary, and concrete tile, blocks, roofing, floor slabs, and joists.

One of the aerial views shows the stone crushing plant at Garnett, Okla., which was acquired by the Chandler interests in 1921. The quarry has been in operation nearly 30 years, and an additional 240 acres of deposit assures a supply of stone for many years to come. The average face in the quarry is 32 ft. high.

Another aerial view is of the concrete products plant, showing pipe stored in yard and the 400-ft. traveling crane for loading pipe trucks and railroad cars. Storage piles of concrete block and concrete tile ready for delivery are seen in the center middleground. At the left is the 800-ton aggregate storage bin. Sand and crushed limestone are received in hopper bottom cars from the stone crushing and sand plants, and dumped into a track hopper. From the hopper the aggregates are elevated by pan conveyor to a Link-Belt bucket elevator which dumps into an octagon shaped steel bin. At the top of the bin is a turntable distributing device, controlled by a wheel and bevel gears from the batching floor below, to distribute different size aggre-

Below: Aerial view of the Chandler Materials Co. stone crushing plant and quarry at Garnett, Okla. The plant was originally operated by the Hughes Stone Co., and the quarry has been in operation for nearly 30 years

gates into the compartments in the bin.

Aggregates are drawn from the bin compartments into a 7 cu. yd. weigh batcher which discharges in turn to a Link-Belt conveyor, extending to the concrete pipe department where the batch is fed to a 21 cu. ft. Blystone mixer. This conveyor is portable, operating on wheels over track, making it possible to move it quickly from beneath the weigh batcher and allow the loading of trucks for hauling crushed stone and sand.

One Mixer Serves All Concrete Product Machines

This plant is very flexible and was designed to provide a consuming outlet for materials produced at the stone and sand plants. When built its use was confined to the manufacture of concrete pipe, ready-mixed concrete and for retail distribution of stone and sand. Two years ago equipment was added for the manufacture of concrete building tile, precast concrete joists, concrete structural tile, roofing and floor slabs.

Originally the Blystone mixer only served the Quinn heavy duty type pipe machine, but it is now also used to provide concrete for the other concrete product machines. A movable belt conveyor diverts concrete to the Stearns power stripper tile machine which has a capacity of 3000 units in an eight-hour shift. The mixer provides concrete for the vibrating table on which concrete joists are made by the use of a bucket which is swung into position by an electric hoist to receive the charge. The bucket then travels by electric crane to the vibrating table where the concrete is discharged into the joist forms.

The pipe plant has a daily capacity of 60 to 70 tons of various sizes of which storm sewer pipe is a specialty. Pipe manufactured ranges in size from 12 to 60 in. A steel cart takes the molded pipe to the curing room where it is sprayed for five days. Wet steam also is used in curing concrete products.

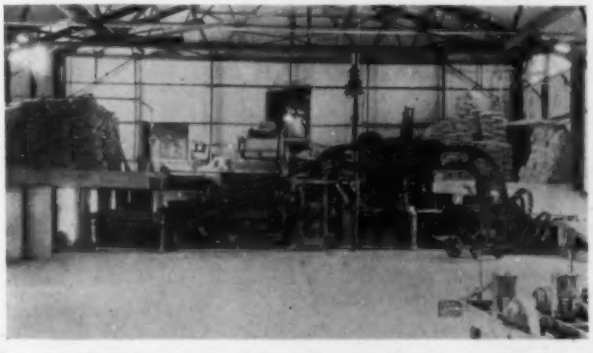
In curing concrete pipe, a jet system of water sprays is used, consisting of 2-in. pipe lengths running crosswise half the length of the building, 8 ft. apart. There are 10 spray jets to each length of pipe and 18 lengths are employed in the spray system. This is regulated with valves so that sprays can be used together or separately to give fine spray or a coarser stream as needed. The concrete floor is made to slope to the rear end of the plant which allows the water to drain off readily.

The plant is completely electrically equipped, having individual motor drives with speed reducers for each machinery unit. Push button starters have been provided at each machine and all are interconnected so that they may be automatically started or stopped in sequence.

Ready Mixed Concrete Made By Subsidiary

Builders Concrete Co., Tulsa, Okla., a subsidiary, obtains all its fine and coarse aggregates from the Chandler Materials Co. batching plant. A specially designed pony hopper traveling on a short section of track is used for charging the mixer trucks. This hopper is drawn into position beneath the weigh batcher previously mentioned.

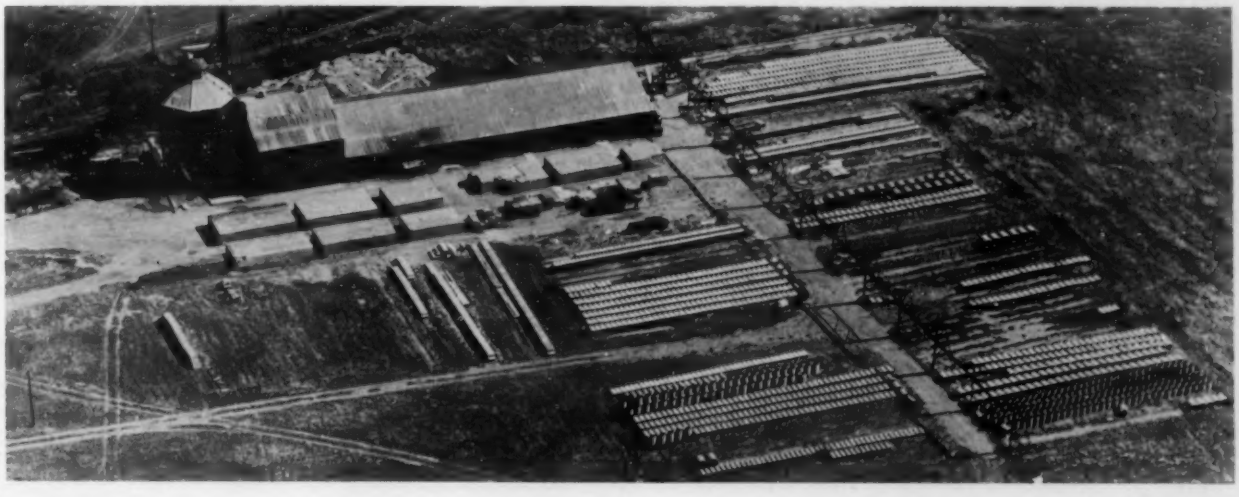
Illustrations loaned through the courtesy of Monarch Cement Co., Humboldt, Kans.



Above, left: Heavy duty concrete pipe machine and concrete mixer. Cement storage platform holds 2400 bbl. of cement

Above, right: One of the trucks for ready-mixed concrete operated by Builders Concrete Co., a subsidiary

Concrete products plant, showing pipe stored in yard, and 400-ft. traveling crane for loading pipe trucks and railroad cars. Storage piles of blocks and tile ready for delivery are seen in the center foreground, and at the upper left is the 800-ton aggregate storage bin



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ONE OF OUR MANY DESIGNS

Chase "all steel" Block racks are built to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work with your lift truck.

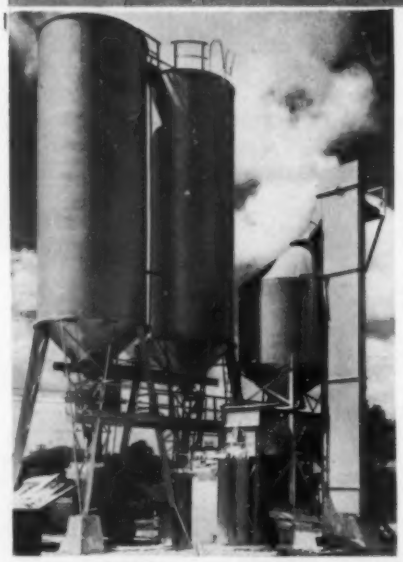
WRITE for Catalog and Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

CHASE DRYER CARS & TRANSFER CARS

CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

The BROOKS-TAYLOR *Lime Putty Plant*



This modern unit provides an economical means of producing and handling aged lime putty for ready mixed brick mortar, plaster and stucco. The lime is slaked under thermal control and pumped to ageing tanks where excess water is removed by means of special filters. Write for information on increasing your volume with a Brooks-Taylor plant.

CHICAGO BRIDGE & IRON COMPANY

Chicago	2452 Old Colony Bldg.	Tulsa	1650 Hunt Bldg.
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Detroit	1553 LaFayette Bldg.	Boston	1564 Consol. Gas Bldg.
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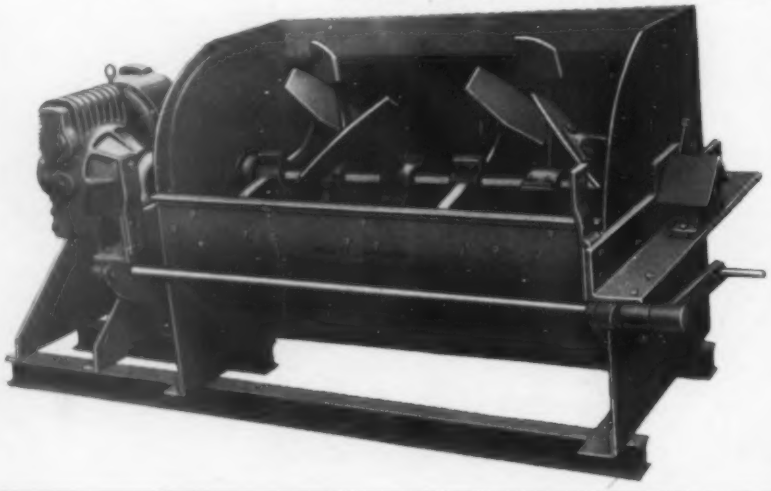
A Better Mix at Lower Cost

★ Per Yard
★ Per Day
★ Per Batch

This is the consensus of opinion of the many concrete products manufacturers who have installed the new Multi-Mixer. Let us show you how you too can profit from its many advantages.

Every detail of the new Multi-Mixer was designed to produce faster, more thorough mixing for any concrete batch. The new design reverse paddle keeps material mixing twice as fast with less friction to liners. Mixes hard or light aggregate with equal ease and efficiency. Heavy roller bearings and simple design keep power requirements low. Paddles and mixing drum easily replaced. Equipped for either direct worm gear, gear drive, belt or V-belt drive—either end or side discharge. Built in the following capacities: 5-12-18-30-40-50 cubic feet.

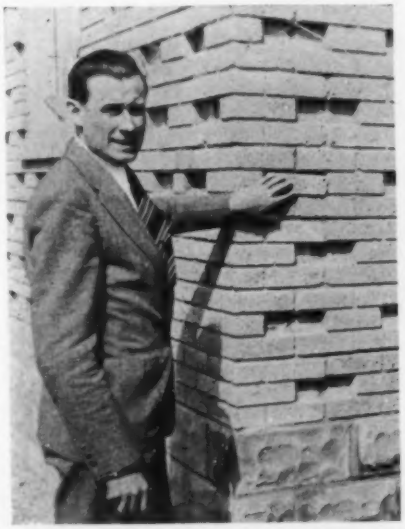


Write for catalog and full information on your products plant equipment requirements —a single unit or a complete plant.

The MULTIPLEX Concrete Machinery Co.
ELMORE OHIO

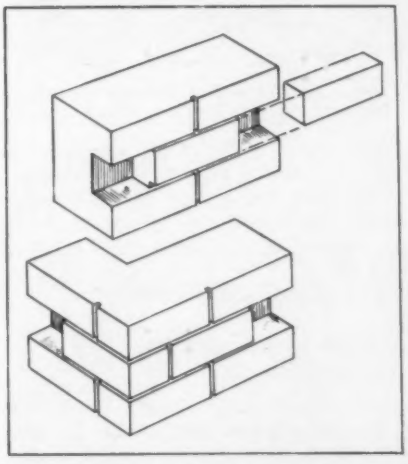
Concrete Block with Brick Face

For years various patented concrete block designs have been developed to produce a unit which would simulate in the finished wall the appearance of



Mr. Wengenroth pointing to tie-in brick placed in between blocks

brick laid up with mortar. Concrete brick are commonly used in many sections of the country and practically any color or surface texture may be secured, but there are certain advan-



Above: Regular brick-faced concrete block, showing how filler brick is used. Below: corner block

tages in labor cost to the use of the larger concrete block that brick do not have.

Edgar R. Wengenroth, West Englewood, N. J., a builder and real estate developer, has applied for a patent on a concrete block with a brick face which, it is claimed, has all the advantages of the concrete block with the attractiveness of the brick. Several houses have been built with the new unit, and the owners have been entirely satisfied with it as a construction unit.

The Brix-block units comprise the regular wall block, a corner block, and tie-in bricks, as shown in the illustration. Although the drawing shows the 4-in. unit only, most of the houses built have been of 8-in. hollow block construction. It will be noticed that for every two regular block, two small filler concrete bricks are used. The filler bricks are placed in the wall with mortar after several courses of block have been laid. Corner block are similarly tied into the adjoining regular block units with concrete bricks. The entire wall is pointed so that a uniform appearance is presented to the eye.

Mr. Wengenroth has worked with concrete block machinery manufacturers to develop production methods and equipment which will make his units to best advantage. He also has constructed a vibrating machine for making 4-in. units, nine at a time, or 24-in. long.

The fastest method, and possibly the cheapest, was a small vibrating machine using a plain pallet, the brick markings being vibrated into the aggregate, face up. By this method it was possible to produce 750 a day of the 24-in. units without much difficulty, and by using sand in place of the cinders, production can be speeded up and a better looking unit can be made.

MOLDS AND FORMS

SEPTICRETE
PRECAST CONCRETE SEPTIC TANKS
A Good Market and Real Profits
Write for Details about Steel Forms
SUBURBAN SANITATION SYSTEMS CO.
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RICKETSON'S
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Since 1885
16 Standard Shades
"You can't Fade 'Em"
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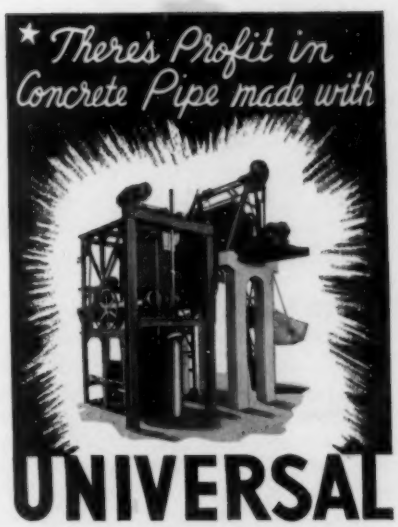
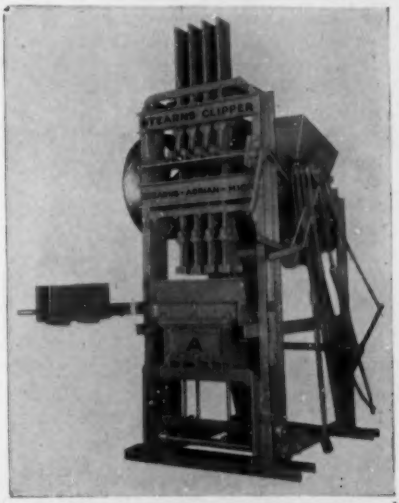
STAR and ANCHOR COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.



The reason is simple. The Universal is an "all-purpose" tamping machine which makes all sizes required in the average market. Consequently only one machine is necessary. This means less labor, less power and keeps plant investment at the minimum.

Write for details now.

UNIVERSAL
CONCRETE PIPE CO. Inc.
COLUMBUS, OHIO

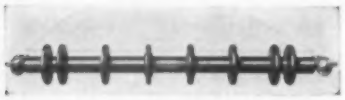


"ANCHOR"
Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service.
Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Jolticrete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.
Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.
Anchor Concrete Mchy. Co.
G. M. Friel, Mgr. Columbus, O.

NEW MACHINERY AND EQUIPMENT

Return Idler for Use with Abrasive Materials

ROBINS CONVEYING BELT CO., New York, N. Y., has developed a return idler which is said to be particularly adaptable for use on a conveyor belt which handles abrasive, corrosive, damp, or somewhat



Return idler equipped with rubber discs mounted on steel shaft

sticky material. It comprises a steel tube shaft on which are mounted a series of tough and resilient rubber discs, spaced about 6-in. apart except at the ends where the last two are about 3-in. apart. Within the steel tube there are mounted New Departure ball bearings which require no greasing or oiling and are sealed against the entrance of grit or moisture.

Owing to its light weight and the use of ball-bearings, the idler turns easily and slippage between the belt and idler is avoided. It is also said to be self-cleaning as conveyed material cannot build up on this idler.

Gasoline Engine for Screening Plant

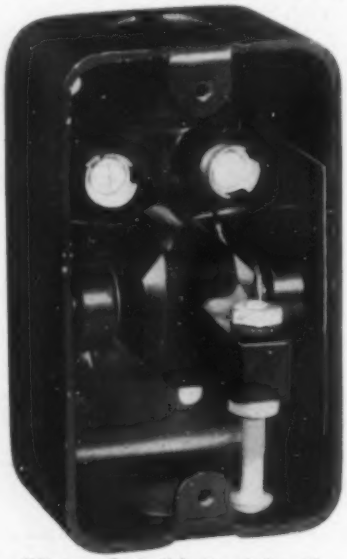
ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., has brought out the model "B-15" gasoline engine which has been used successfully on its model "B" tractor. It is a 4-cycle, 4-cylinder engine with a bore of 3¼-in., a stroke of 3½ in., and 116 cu. in. displacement.

Gasoline engine which develops a maximum of 19 b.hp. at normal governed speed

Other features include: removable cylinder liners, high tension magneto ignition, a heavy duty oil bath air cleaner, oil and fuel filters. The engine develops a maximum of 19 b.hp. at its normal governed speed of 1400 r.p.m.; at 1800 r.p.m. it develops 22 b.hp. maximum. It is 31 1/16-in. high, 17⅝-in. wide, and 52¾-in. long, including starting crank. This unit is said to be particularly suitable for gravel washing and screening plants, asphalt plants, portable concrete mixers, and pumps.

Mercury-Button Limit Switch

GENERAL ELECTRIC CO., Schenectady, N. Y., has developed a single-pole limit switch which uses a mercury-button mechanism to open and close the circuit. The device is said to be particularly suitable for use where the force



"Mercury Button" limit switch, with cover removed

available for operation of the switch is small, inasmuch as the only force required to operate this switch is that necessary to lift a lightweight molded lever which returns to its lower position by its own weight.

The mercury-button element consists of two corrosion-resistant metal hemispherical shells separated by a special ceramic disk with an off-center hole. The assembly is partially filled with mercury, and an atmosphere of hydrogen prevents burning and corrosion. When the mercury-button is rotated in the vertical plane, the off-center hole, normally below the surface of the mercury is raised out of the mercury, thus opening the circuit between the metal shells.

Tower Excavator

SAUERMAN BROS., INC., Chicago, Ill., has announced the latest addition to its line of long range machines; a 4-cu. yd. tower excavator. This machine is said to be particularly adaptable for sand and gravel excavation and open pit mining of loose minerals.

The new machine is furnished with a 4-cu. yd. Crescent scraper bucket and carries on the head-tower a special two-drum hoist, powered with either a 170-hp. gasoline engine or a 150-lb. electric

Tower excavator of 4 cu. yd. capacity, showing empty scraper bucket returning into pit

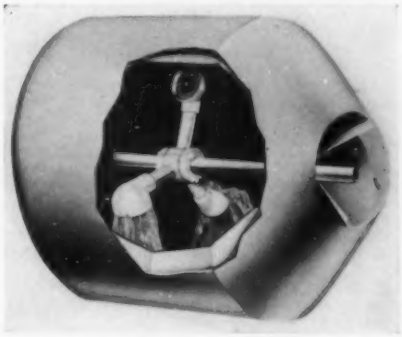
motor. It is designed for any span of operation up to 1000 ft. It is claimed that when excavating ordinary sand and gravel with the scraper on an average haul of 200 ft., the hourly output is 170 cu. yd. This output increases, of course, if the haul is shortened.

Water Impeller For Truck Mixer

BLAW-KNOX CO., Pittsburgh, Penn., has developed a water impeller for its line of Trukmixers which is attached to the water line at approximately the center of the drum. There are three outlets, each of which terminates in a nozzle that is protected against the action of the aggregates, and sealed against intrusion of mortar and cement.

Fast water is important on short hauls, or where mixing is not permitted until the truck mixer arrives at the job. With these considerations in mind, the impeller has been designed to provide fast flow and rapid distribution of wa-

ter uniformly throughout the batch. The radial distance between the axis of the water pipe and the nozzle discharge opening materially increases the pressure head. Moreover, the discharge openings, being at right angles to the axes of rotation, create a suction due to the relative motion between nozzles and concrete; this is accomplished without the use of a pump. Finally, the use



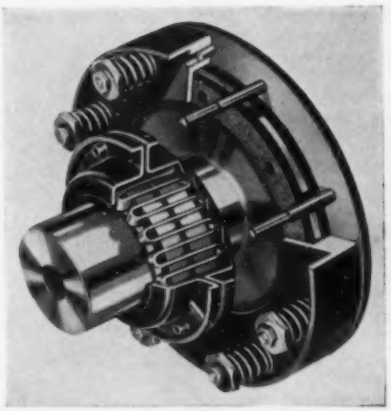
Three-nozzle type water impeller

of three outlets spaced 120 deg. apart insures greater continuity of water flow since two of the outlets are discharging at all times.

Controlled Torque Coupling

THE FALK CORP., Milwaukee, Wis., is offering the industry a "controlled torque Steelflex coupling," designed to provide protection to mechanical drive systems against the damage caused by shock overloads. It is claimed that this coupling affords protection against peak loads which range from 500 to 1000 percent of the normal torques.

The controlled torque Steelflex coupling combines the functions of an adjustable friction clutch and a flexible coupling. Torque transmitted through the coupling is controlled through the adjustment of the load regulating springs which control the pressure on



Cut-away view of coupling showing grid-groove feature which takes up shocks

the friction faces. Pressure on the load regulating springs can be varied so that the torque range varies from practically zero up to the rating of the coupling.

In addition to this ability to slip under instantaneous high peak loads, it is claimed that the coupling also performs the usual features of a truly resilient coupling, such as damping out shocks, reducing vibration, and allowing parallel and angular shaft misalignment.

Produces Rock Chips As By-Product

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has designed a screening arrangement for their Vibrator-Duplex crushing plant that will produce rock chips as a by-product simultaneously while producing road gravel. With this equipment, rock chips are produced for the seal coat at the same time that the base course material is being made. Crusher dust is screened out of the chips and mixed with the road gravel. No extra screens or equipment are required to perform this added operation.

With this type of crushing plant, the bottom deck screens the pit run material only and the top deck screens the crushed material. By this arrangement, the pit material and the crushed material are not mixed together, and it is possible to screen out 100 percent crusher chips on the top deck. Chip spouts are provided to deliver the chips to a belt conveyor. Road gravel and rock chips are produced and sand is rejected, all at the same time.

Increase Power for Industrial Locomotive

BROOKVILLE LOCOMOTIVE CO., Brookville, Penn., has added a 95-hp. model to its line of Ford-powered industrial locomotives. Models are available ranging from 2½ to 8 tons in size, in any gauge. The locomotives are equipped with an all-speed reverse, which makes all forward speeds operate in either direction, and a dual-spring journal suspension

Higher powered industrial locomotive has all-speed reverse which makes all forward speeds available in either direction

makes possible higher speeds over poor track. Where Diesel power is desired, the Ford V-8 engine may be replaced with several types of Diesel engine.

Crushing and screening plant which produces road gravel and rock chips and rejects sand, all at the same time

Twin-Type Welding Hose

THE MANHATTAN RUBBER MFG. DIVISION, Raybstos-Manhattan, Inc., Passaic, N. J., has brought out a new development, known as Condor Duplex welding hose, which is designed to make welding safer than is possible with separate oxygen and acetylene lines, states the manufacturer. The two hose lines are held together by a permanent web joint, integrally molded, which it is said prevents tangling, kinking, and snagging of the hose. The ends are separated 18-in. for the torch end and 24-in. for the tank end. Strong inner tubes are used in the construction of the hose which has tough, flexible corrugated covers that are colored red and green to distinguish between the two lines.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of May 13:

Central

57771. Cancel from Sou. Ry. (St. Louis-Louisville divisions) General Commodity Trf. 1225-J, various items publishing rates on **barytes** (not ground); **lime**, agricultural and fluxing; **mica**, ground; **limestone**, crushed, ground or pulverized, not burnt; **agricultural limestone**, reground or pulverized, unburnt. **Fluorspar**, in packages or in bulk, C. L., from Harrodsburg, Ky., to Chicago, Ill., 418c net ton; to Indianapolis, Ind., 369c net ton; from Wilmore, Ky., to Chicago, Ill., 418c net ton; to Indianapolis, Ind., 369c net ton. Lime, agricultural and fluxing, having no commercial value for chemical or building purposes, straight or mixed C. L., from Milltown, Ind., to New Castle, Ind., 12c per 100 lb. **Mica**, ground, C. L., min. wt. 40,000 lb., from Evansville, Ind., to Vandalia, Ill., 246c per net ton (interstate), 8c per 100 lb. (intrastate). Agricultural limestone, ground or pulverized unburnt, C. L., from Marengo and Milltown, Ind., to Indiana and Illinois points. Rates ranging from 111c net ton to 332c for interstate and from 111c to 263c for intrastate. Class or combination rates to apply.

57845. Establish on **sand** (except industrial) in open top equipment, C. L., Essex, Ill., to Benton Harbor and St. Joseph, Mich., 127c per net ton, via Wab. Ry., Chicago or Steele, Ill., M. C. R. R. and via Wabash Ry. Chicago, Ill., P. M. Ry.

57846 (cancels W. D. A. 57432). Establish on **limestone**, ground or pulverized, unburnt C. L., min. wt. 60,000 lb. Northwestern Ohio Group 1 origins, and Marble Cliff, Ohio, to C. & O. Ry. stations in Kentucky. From Gibsonburg, rates ranging from 226c to Burnaugh (251.6 mi.) to 281c to Elkhorn City (369.2 mi.); and from Marble Cliff, West Columbus, rates ranging from 176 to Burnaugh (138.6 mi.) to 226c to Elkhorn City (256.2 mi.).

57876. Establish on **sand** (except industrial), in open top equipment, C. L., Essex, Ill., to Warsaw, Ind., 138c per net ton, via Wab. Ry. Chicago, Ill., P. R. R. and via Wab. Ry., New Paris, Ind., Winona R. R.

57891. Establish on **limestone**, agricultural, unburnt, and screenings, agricultural limestone, in bulk, in open top cars, Spore, Ohio, to Amsterdam, Hopedale, Tag Siding, Florence, Ohio., 138c, Piney Fork, Harpersville, Dillonvale, Bradley and Smithfield, Ohio, 149c per net ton.

57949. Establish on **cement** or **concrete building blocks** (not reinforced with metal), (solid, hollow or perforated) except enameled, individual blocks not being packed, Rule 24 Offi. Classn. not to apply, Indianapolis, Ind., to Lafayette, Ind., 200c per net ton via C. C. C. & St. L. Ry. direct.

57997. Establish on **fluxing stone**, C. L., to Barberton, Ohio, from Cleveland, Ohio (ex-lake) and Lorain, Ohio (ex-lake), 77c per gross ton. Routes: From Cleveland, Ohio.—Via B. & O. R. R.; via Erie R. R. and via P. R. R. From Lorain, Ohio.—Via B. & O. R. R.

58007 (Cancels W. D. A. 57808) Establish on **dust, limestone**, in bulk or in bags, in box cars, C. L., min. wt. 80,000 lb., from Alpena, Mich., rates in cents per net ton:

To (Mich.)	Prop.	To (Mich.)	Prop.
Amasa	259	Little Lake	226
Bergland	281	Manistique	204
Big Bay	237	Marquette	226
Calumet	270	Menominee	259
Cascade Jct.	226	Metropolitan	248
Champion	237	Munising	215
Channing	248	Munising Jct.	215
Craigsmere	281	Nestoria	248
Crystal Falls	259	Newberry	187
Eben Jct.	215	Negaunee	237
Eckerman	187	N. Ironwood	292
Ewen	270	Ontonagon	281
Escanaba	226	Palmer	237
Faithorn Jct.	237	Princeton	226
Freda	270	Rapid River	215
Gibbs City	270	St. Ignace	154
Gladstone	226	Sault Ste. Marie	193
Hancock	270	Shingleton	204
Houghton	270	Soo Jct.	182
Iron Mountain	248	Spalding	226
Iron River	259	Stager	259
Ishpeming	237	Swanzy	226
Klondike	215	Trout Lake	176
Ladoga	237	Watersmeet	281
Lake Roland	281	Hurley, Wis.	303
Lawson	226		

58041. Establish on **sand**, industrial, C. L., Wilmington, Ill., to Crawfordsville, Ind., 187c per net ton, via Alton R. R., Bloomington, Ill., C. C. C. & St. L. Ry.; Alton R. R., Chicago, Ill., C. I. & L. Ry., and Alton R. R., Chicago, Ill., P. R. R.

58044. Establish on **sand and gravel**, C. L., Lake Ciecott, Ind., to South Bend, Ind., 77c per net ton.

58064. Establish on **crushed stone and crushed stone screenings**, C. L., in open top cars, to Anderson, Ind., from Wabash, Ind., 77c, and N. Vernon, Ind., 94c per net ton via C. C. C. & St. L. Ry. direct.

58108. Establish on **sand** (except industrial), in closed equipment, and in open top equipment, C. L., from the so-called Vassar group, viz.: Vassar, Wampson, McHale and Juniata, Mich., to Williamsport, Penn., 319c per net ton.

58124. Establish on **stone**, fluxing, furnace or foundry, melting or refractory, unburnt, in bulk, in box cars, C. L. (See Note 3), Marble Cliff, Ohio, to Newark, Ohio, 90c per gross ton.

Trunk

M-3952. (A) **Sand** (other than industrial), in open top cars without tarpaulin or other protective covering, C. L. (B) **Sand** (other than industrial), in closed cars; **sand**, naturally bonded moulding, in open or closed cars, C. L. (See Note 3), to Oshawa, Ont., from stations in Perth Amboy district, (A) $5.56 and (B) $5.86 per net ton, and from South Jersey producing points, (A) $5.67 and (B) $5.98 per net ton. Reason—Comparable with rates from and to other points in immediate vicinity.

Sup. 2 to 37617. **Ground limestone**, C. L., min. wt. 60,000 lb. Rate in cents per 100 lb.:

	From	
To	Group 1	Group 2
Montreal, Que.	643	654
Granby, Que.	643	654
Sherbrooke, Que.	714	725
Quebec, Que.	823	834
Windsor, Que.	440	440

Group 1—Stations Bridgeport, Cedar Hollow, Plymouth Meeting, Swedeland, Penn., etc.

Group 2—Stations Annville, Lebanon, Palmyra, Penn., etc.

37634. **Crushed stone** and **screenings**, in straight or mixed C. L. (will not include agricultural limestone or ground limestone, unburnt; fluxing stone or firestone; or stone, coated with oil tar or asphaltum) (See Note 3), from Monocacy, Penn., to Syracuse, N. Y., $2.31 per net ton, in lieu of current commodity rate of $3.36 per net ton.

37640. **Sand**, naturally bonded molding, in open top cars, or in box cars, C. L., from Catasauqua, Penn., to Royersford, Penn., $1.32 and to Tatamy, Penn., $1.10 per net ton, in lieu of current class rates.

Sup. 1 to 37640. **Sand**, naturally bonded moulding, in open top cars or in box cars, C. L., from Slatington, Penn., to Royersford, Penn., $1.32, and to Tatamy, Penn., $1.21 per net ton.

Sup. 2 to 37641. **Plaster** (Notes A and B), C. L., viz.: Gypsum blocks, mortar, dry, fireproofing, calcined (plaster of paris), land, marble dust, stucco and wall.

Note A—Rates will also apply on **lime**, agricultural and/or building, when in mixed C. L. with any or all of the articles named in the item, the quantity of lime not to exceed 25 percent of the min. wt. on plaster.

Note B—Mixed C. L. of **building lime** and/or agricultural lime and/or plaster and articles taking some rates and/or plasterboard, will be charged at actual wt. and at the applicable rate for each of the respective commodities subject to the min. wt. of 40,000 lb. for each mixed C. L., deficit in the min. wt., if any, to be paid for at the rate applicable on plaster.

Min. wt. 40,000 lb., from Victor, N. Y., to McKeesport, Penn., 17c per 100 lb., in lieu of current sixth class rate. Reason—Comparable with rates from other points in immediate vicinity.

37653. **Stone**, natural (other than bituminous asphalt rock), without coating of oil, tar and/or asphaltum, C. L. (See Note 3), from Jamesville, N. Y., to Painted Post, N. Y., $1.43 per net ton, in lieu of current commodity rate of $1.65 per net ton.

37665. **Crude fluxing limestone**, C. L., min. wt. (See Note 3), from Bellefonte and Pleasant Gap, Penn., to Athens, Penn., $1.97 per gross ton, in lieu of current 6th class rate of 19c per 100 lb.

37675. **Stone**, natural (other than bituminous asphalt rock), crushed, C. L.; min. wt. (See Note 3), from Mill Hall, Penn., to Ridgway and Johnsonburg, Penn., $1.65, Kane, Penn., $1.76 and St. Marys, Penn., $1.54 per net ton, in lieu of current sixth class rates.

37703. **Slag**, not suitable for further extraction of metal in bulk, C. L. (See Note 3), from Cartaret, N. J., to Trenton, N. J., $1.21 per 2000 lb. Reason—Account comparable with rates from and to other points in immediate vicinity.

37709 (increase). Cancel the following commodity rates on **limestone**, ground, agricultural, C. L., from Cambria, N. Y., as published in N. Y. C. R. R. Tariff I. C. C. 16259 (rates in cents per 100 lb:

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

To M. C. R. R. stations: St. Thomas, Ont., to Villa Nova, Ont., incl., 14; Townsend, Ont., to Welland, Ont., incl., 13; Montrose, Ont., to Niagara Falls, Ont. incl., 10½; Brookfield, Ont., to Stevensville, Ont., incl. 13; Fort Erie, Ont., to Bridgeburg, Ont., incl. 10½; Shipyard, Ont., 13; Black Creek, Ont., 13; Stamford, Ont., to Niagara-on-the-Lake, Ont., inc., 13 (See Note 4).

Southwestern

16406. Stone, crushed, Colorado to Fort Worth and Dallas, Tex. To establish a rate of $4 per ton of 2000 lb. on crushed stone, C. L. (See Note 3), from Wild Spur, Colo., Berthoud, Colo., and other producing points related thereto, to Dallas and Fort Worth, Tex.

16769. Tripoli, Baxter Springs, Kan., also Racine and Seneca, Mo., to Chicago, Ill. Establish rate of $3.63 per ton of 2000 lb. on tripoli, low grade, undried, containing 2 percent or more moisture, C. L. (See Note 1), but not less than 60,000 lb., except when car of less capacity is furnished at carriers' convenience, in which event marked capacity of car will apply, from Baxter Springs, Kan., also Racine and Seneca, Mo., to Chicago, Ill.

16425. Lime (calcium), Limedale Spur, Ark., Dittlinger, Houston, Oglesby and Round Rock, Tex., to Carteret, N. J. To establish on lime, C. L., to Carteret, N. J., rates of 41c, min. wt. 30,000 lb. and 32c, min. wt. 50,000 lb., from Limedale Spur, Ark.; 50c, min. wt. 30,000 lb., and 40c min. wt. 50,000 lb., from Dittlinger, Houston, Oglesby and Round Rock, Tex.

16496. Limestone, Ste. Genevieve and Mosher, Mo., to Natchez, Miss. Establish rate of $2.87 per net ton on crushed or ground limestone, C. L., min. wt. 60,000 lb., from Ste. Genevieve and Mosher, Mo., to Natchez, Miss.

Southern

18867. Slag, C. L. Establish 372c net ton, Holt, Ala., to Temple, Tex.

18885. Reduce rate on ground phosphate rock from Fla. mines to Hattiesburg and Laurel, Miss., from 561 to 520c per gross ton.

18890. Barytes (not ground), C. L. Establish 584c from Sweetwater, Tenn., district; 639c from Jamestown, Tenn., and 562c gross ton from Kings Creek, S. C., to Brooklyn, N. Y., Grasselli, Irvington, Jersey City, N. J., Long Island City and New York, N. Y.; also 639c gross ton from Jamestown, Tenn., to Pittsburgh, Penn.

18901. Slag, C. L. Establish 297c net ton from Mt. Pleasant, Tenn., to Alexandria, Ind.

19038. Sand, C. L., establish to Atlanta, Ga., from Gaillard, Junction City, Heath Track, Kirkpatrick Sand Pit Track, Kirkpatrick Wash Track and Roberta, Ga., 65c; and from Columbus, Ga., 75c net ton. Truck competitive.

19052. Lime, C. L. Establish 374c C. L., min. 30,000 lb., and 299c net ton, C. L., min. 50,000 lb. L. & N. stations in Ala., in origin groups Nos. 45 through 56 of S. F. T. B. Tariff 382-A to Miss.

19070. Sand and gravel, C. L. Establish 55c net ton from Osaka and Berrylum, Ala., to Pensacola, Fla. Water competitive. Expires December 31, 1939.

19071. Phosphate Rock, C. L. Establish 75c gross ton from Coronet, Fla., to South Boca Grande, Fla., for export or coastwise movement.

19089. Barytes, crude, lump or jigged, C. L. Establish from Brerfield, Ala., 662c; gross ton to Brooklyn, Long Island City and New York, N. Y., and 562c gross ton to St. Helena, Md.

Illinois

I. R. C. 7063-A. Lime: To cancel rates of 9c per 100 lb., C. L., min. wt. 30,000 lb., and 7c per 100 lb., C. L., min. wt. 50,000 lb., for application to lime, from C. & E. I. Ry. stations South Holland, Ill., to Chicago Heights, Ill., and I. H. B. R. R. stations Ivanhoe, Ind., to Dune Park, Ind., to Chicago, Ill.

I. R. C. 7496-4. Sand and gravel, as described under Section A, Rule 85, I. C. R. R. Tariff 13321-H, from Bloomington, Ill., to various destinations in Illinois (rates per net ton), to representative points: Moneen 124c; Bradley, 111c; Gilman, 107c; Rantoul, 97c; Champaign, 97c; Magnet, 110c; Edgewood, 115c; Elders, 84c; Barnes, 80c; Lodge, 93c; Pana, 98c.

I. R. C. 7496-D. Sand (except industrial) and gravel, in open top cars, C. L. (See Note 3), from Bloomington, Ill., to Farmer City, Mansfield, Mohamet, Ill., present 84, proposed 77.

IRC 7497-13. Agricultural limestone, C. L., marked capacity of car but not less than 40,000 lb., Joliet, Ill., to Washington, Ill. Present, 88c net ton; proposed, 69c net ton.

I. R. C. 7497-14. Agricultural limestone, C. L., marked capacity of car, but not less than 40,000 lbs., from Joliet, Ill., to Morton, Ill. Present—97c per ton. Proposed—69c net ton.

I. R. C. 7497-15. Agricultural limestone, ground or pulverized, in bags, barrels or in bulk, min. wt., 60,000 lb.:

To Sou. Ry. Stas. (Rep.)	Pres.	* Pro.	‡ Pro.	‖ Pro.
Marlow, Ill.	97	77	..	..
Wayne City, Ill.	111	88	..	..
Golden Gate, Ill.	122	88	..	..
Mt. Carmel, Ill.	122	99	†	†

*From East St. Louis (Falling Springs).
‡From Krause, Ill., Stolle, Ill.
‖From Valmeyer, Ill.
†Rates based usual differentials over Falling Springs, Ill.

I. R. C. 8439-7. Sand (except industrial) in open top equipment (See Note 3), but orders will not be taken for open top cars of less marked capacity than 80,000 lb. present rate class basis; proposed, from Essex, Ill., to Elgin, Ill., $1.30, Batavia, Ill., $1.21, St. Charles, Ill., $1.21, Freeport, Ill., $1.49.

I. R. C. 8801. Sand and gravel, C. L., min. wt. (See Note 3), but in no case less than 40,000 lb. per car, to Glenview and Northbrook, Ill. Present rate, 70c. Proposed, 55c. From Afton, Wis., Janesville, Wis., South Beloit, Ill., Burlington, Wis., Elgin, Ill., present 72c; Hammonds, Ill., present 72c; Waukesha, Wis., present 70c.

I. R. C. 8439-5-A. Sand (except industrial), in closed equipment, C. L., from Essex, Ill.: Present class rates per net ton, class rates. Proposed to the following Wisconsin points: Kenosha, $1.65; Racine, $1.76; Milwaukee, $1.87; S. Milwaukee, $1.76; Waukesha, $1.87.

8798. Sand (except industrial), gravel and crushed stone, C. L., usual min. wt., from Louisiana, Mo., to the following Illinois points. Sand and gravel: present 139c. Berdan, 97c; Carrollton, 97c; Kane, 97c; Jerseyville, 103c; Delhi, 111c; Godfrey, 111c; Kaser, 97c; Hurricane, 97c; Eldre, 97c; Boyle, 124c; Clark, 124c; King, 124c; Wilcoxson, 124c; Bakersfield, 127c; East Hardin, 127c; Stone: present rate, 124c; proposed to Whitehall, 97c; Berdan, 97c; Carrollton, 97c; Kane, 97c; Jerseyville, 103c; Delhi, 111c; Godfrey, 111c. Present rate, 139c; proposed to Kaser, 97c; Hurricane, 97c; Eldred, 97c; Boyle, 124c; Clark, 124c; King, 124c; Wilcoxson, 124c. Present rate, 153c, proposed to Bakersfield, 127c; East Hardin, 127c.

8439-8. Sand (except industrial), in open top equipment, C. L. (See Note 3), but orders will not be accepted for cars of less marked capacity than 60,000 lb. and 80,000 lb., respectively.

From Essex, Ill., to Beloit, Wis. Present—Class. Proposed—$1.38 per net ton.

Request Lower Sand and Gravel Rates

An Illinois Commerce Commission hearing is scheduled on the application of the Illinois Terminal Railroad for a reduction in freight rates on sand and gravel in Illinois. The railroad asked approval for a reduction from $1.11 a ton to 97c a ton on sand and gravel hauled between Chillicothe, Springfield and Decatur and intermediate points on the Illinois Terminal Electric Railroad. Other railroads had protested on the ground that the lower rate might disrupt the entire rate structure.

Modify Short-haul Rates To Meet Truck Competition

The I. C. C. has further modified No. 22109, rates on sand, gravel, crushed stone, etc., within South Carolina so as to exempt from the provisions thereof the intrastate movement of crushed stone from Blair, S. C., to Newberry, S. C. The Southern railway asked for modification so as to establish a rate of 50c a ton for a 35-mile haul. The present rate is 70c. The railroad said it had been told that there would be a large movement of crushed stone to Newberry for use in paving and that unless there was a rail rate of 50c it would be moved by unregulated contract trucks at a rate of 45c.

Investigate Ohio Rates on Fluxing Stone

The I. C. C., in No. 28218, intrastate rates on fluxing stone in Ohio, has instituted an investigation, on its own motion, to determine whether rates on fluxing stone from Marblehead, Ohio, to destinations in the Mahoning valley and also to Canton and Massillon which are outside the valley, result in undue or unreasonable advantage, preference or prejudice as between persons or localities in intrastate commerce, on the one hand, and interstate or foreign commerce, on the other.

Revise Rates On Chalk

A revision of interstate rates on chalk whiting from Camden, N. J., to destinations in official territory and intrastate rates in New Jersey on that commodity is to be made by the railroads on or before June 15 under findings and order made by the I. C. C. in No. 27921, Southwark Manufacturing Co. vs. Pennsylvania-Reading Seashore Lines et al. The title complaint alleges that the rates on chalk from Camden to destinations in official and southern territories are unreasonable, unduly prejudicial to the complainant and unduly preferential of its competitors shipping ground limestone in the same territory.

NEWS of the month

Plan Large Cement Mill for Cupertino, Calif.

HENRY J. KAISER AND ASSOCIATES, Oakland, Calif., are planning to build a large cement mill in the Permanente Canyon district, near Cupertino, Santa Clara County, Calif., to furnish cement for construction of the Shasta power dam, Central Valley project of the federal government. The company has put up a $3,000,000 bond with the government to deliver 5,800,000 bbl. of cement at $1.19 per bbl. Costing about $3,500,000, the new mill will comprise several units, with packing, storage and distributing buildings, power house, machine shop and other structures. A permit for the cement plant was sought in the name of the Permanente Corporation, a subsidiary of Pacific Coast Aggregates, Inc., San Francisco, Calif.

Considerable local residential opposition has been stirred up by the announcement that the cement mill will be built, but the company has assured the protestants that the Cottrell system of dust collection in the proposed plant will practically eliminate all dust and that the wet process will be used in manufacturing cement. It is reported that the plant will have a capacity of 7000 bbl. per day.

New Owner for Sand Company

THE CANEY CREEK SAND & GRAVEL CO., Rockwood, Tenn., has opened up new offices on Front street following a reorganization of the company. J. O. Bowman is now the principal owner. John A. East will be associated with Mr. Bowman in charge of sales and production. New equipment will be added to the plant at Caney Creek Landing on the Tennessee river.

Settlement of Coal Strike Opens Cement Plants

SEVERAL CEMENT PLANTS in the East found it necessary to shut down temporarily due to a shortage of fuel caused by the coal strike. These plants planned to resume operations immediately following the settlement of the strike. Some of the plants which shut down temporarily included: North American Cement Co., Security, Md.; Lone Star Cement Corp., Norfolk, Va.; Valley Forge Cement Co., West Conshohocken, Penn.; North American Cement Co., Alsen, N. Y.; Edison Cement Co., Elizabeth, N. J.; Nazareth Cement Co., Nazareth, Penn.

To Produce Aggregate from Coral Rock

DIAMOND BLOCK CO., Miami, Fla., is constructing a plant to produce aggregate for the manufacture of concrete block. An 8-in. pump is being installed to reclaim coral rock from a deposit worked previously, with the oversize to be crushed through rolls. Enough aggregate will be produced for the block plant needs only, and will be trucked to the plant.

Large Contracts for "Sugar" Stone

OLSEN QUARRIES CO., Weeping Water, Nebr., has obtained a contract from the Crystal Sugar Co., Denver, Colo., for 200 carloads of crushed stone used in the manufacture of beet sugar. Another contract secured by Mr. Ole Olsen, president of Olsen Quarries, is with the Ash Grove Lime and Portland Cement Co. plant at Louisville, Nebr., for 250 carloads of stone. Considerable crushed stone for building construction in Denver, Colo., also has been booked.

Increase Capacity of Gravel Plant

LANCASTER SAND AND GRAVEL CO., Lancaster, Ohio, has made a number of improvements at its Hooker plant which will increase capacity nearly 8 tons per hour. Two old gasoline engines have been replaced with a single 110-hp. natural gas engine, which will furnish all of the power needed for the plant as well as operate the newly installed 30-kw. generator to provide their own power for three motors and lighting. The conveyor has been rebuilt and extended 160 ft. It is a wet pit deposit, using a dredge for excavation. J. B. Clawson, general manager, reports that business volume during the first quarter has equaled that of the first six months of last year, and indications point to the best year in the five years' existence of the company.

Changes Ownership

FRED A. RIDER, INC., said to be the oldest washed sand and gravel company in Broome county, has been sold to Barney & Dickenson Construction Co., Binghamton, N. Y. Mr. Rider, former owner, announced that he will remain with the new concern for at least two years. The sale included approximately 140 acres of land near Willow Point, a brick plant, cinder concrete block plant, steam shovels, screens, and sand and gravel washing equipment.

Build Gravel Plant On Island

VALLEY SAND & GRAVEL CO., Pearisburg, Va., is the name of a comparatively new company which has recently constructed a sand and gravel plant on Pearis Island in New river, a short distance from the Norfolk & Western Railway station at Pearisburg. The 26-acre island offers ample space for the plant and adequate source of materials.

Pennsylvania Stone Producers Meet at Harrisburg

CRUSHED STONE producers of Pennsylvania held a meeting on April 18 at Harrisburg, Penn. A spirited discussion on the proposed change in the scale of rates in dump truck operation suggested by the Pennsylvania Utilities Commission in March was the principal subject of interest to delegates of the Pennsylvania Stone Producers Association. President W. W. Duff introduced Mr. Goldbeck and Mr. Boyd of the National Crushed Stone Association who outlined the activities of the national association and the work in the laboratory. Another topic of interest was the question of diversion of highway funds.

Cement Plant For Africa

NATIONAL CEMENT CORP., (PTY.), LTD., with a capital of approximately $2,500,000 has started construction of a cement plant at Cape Flats, South Africa, which, it is said, will use a new process to produce 750,000 tons of cement annually. Capital for the venture is reported to have been subscribed by a Swiss syndicate under the control of the Holderbank Cement Co.

New Phosphate Company

FLORIDA PHOSPHATE AND MINING CORP., Anthony, Fla., a new concern, has been recently organized to mine colloidal phosphate, hard phosphate rock and limestone at Anthony, Marion county, Fla., and is in the process of erecting kilns and installing crushing equipment. Site of the plant is on a 160-acre tract of land, part of which was worked 40 years ago.

E. C. Pfeiffer is president of the company, J. P. Pfeiffer, vice-president and W. C. Pfeiffer, secretary-treasurer, all former road contractors in the mid-western states.

The Pfeiffers became interested in fertilizers and did considerable exploration work through Florida before selecting the site, where limestone and phosphate are both available. The land contains about 430,000 tons of limerock, 222,000 tons of hard phosphate rock and 46,000 cu. yd. colloidal phosphate, all available with very little preliminary stripping. All three types of rock will be excavated, using contractors' types of equipment, and bins are to be erected for storage of each. Aside from the land under work, the company has established an experimental station where 12 types of native crops are planted, each type in fertilized and unfertilized soil, to compare the crops raised from each.

P.C.A. Wins Trade Association Award

PORTLAND CEMENT ASSOCIATION, Chicago, Ill., won the American Trade Association Executives contest for the most successful program of activities during 1938. In presenting the award to William M. Kinney, vice-president and general manager of the P.C.A., the committee cited the development of low-cost soil-cement roads for secondary highways which had opened up a new market for cement as one of the achievements that had won the award. This new market consumed 250,000 bbl. of cement last year. For the current year, it is expected that this figure will be increased to 500,000 bbl., and it is eventually anticipated that this market will be increased to 10,000,000 bbl. or more annually.

Big Cement Demand Expected On Pacific Coast

CONSTRUCTION of two big dams on the Pacific Coast will very materially affect cement mill operations on the Pacific Coast. It is estimated that the Shasta dam project and the completion of Grand Coulee will require over 10,000,000 bbl. of cement. It is of interest to note that the entire production volume of cement mills last year in California, Oregon and Washington amounted to only 13,500,000 bbl. If the contracts for cement to supply these two dams are spread over three years, they alone would represent an increase of nearly 25 percent to the 1938 production of these three states. Last year California operated at about 46 percent of capacity, and the Pacific Northwest about 40 percent. It is expected that the Grand Coulee dam construction will call for bids this fall totaling about 5,000,000 bbl.

Increase North Carolina Sand and Gravel Rates

RAIL CARRIERS of the Southern Freight Association were recently authorized by Commissioner Stanley Winborne of North Carolina to adjust intrastate rates upward on road building materials, effective May 29. The order by the North Carolina Utilities Commission stated that the increase in rates on sand, gravel and related articles will be substantially less than those authorized by the commission April 11, 1938. The new intrastate rates will correspond to sand and gravel rates approved last year by the I. C. C. for the southeast in the Mississippi case.

Start Up Howe Cave Mill

NORTH AMERICAN CEMENT CO. placed the Howe Cave, N. Y., plant on a three-day schedule of operations on May 1, following a winter shut-down. Officials are anticipating a good season and plan to increase operations when demand picks up.

Temporary Shutdown

DEWEY PORTLAND CEMENT CO., Bartlesville, Okla., plant has been closed temporarily, according to an announcement by D. M. Tyler, vice-president and general manager. It is expected that with the opening of road construction activities and increased building, the plant will soon be reopened.

Lehigh to Construct Office Building

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., will replace the Young building with a seven-story, modern monolithic concrete structure to house its offices. Precast concrete blocks will be used for the fronts of the street level stores. Glass blocks will be used for most of the wall surface of the east side of the building in place of windows, and aluminum casement-type windows will be placed in the rest of the structure. A deep well is being drilled to assure a supply of 200 g.p.m. of water for the air conditioning system for the entire building.

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You can meet the strictest specification requirements with STANDARD screens. Their tapered perforated holes assure less blinding. Superior quality means longer wear and less repair.
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ROGERS CRUSHERS
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10"x36" Anti-Friction Bearing Crusher
7 REASONS WHY!
1—UNEQUALLED PRODUCTION (Users Report)
2—LOWEST MAINTENANCE COST (Users Report)
3—UNMATCHED RUGGEDNESS (Experience Shows)
4—LARGE CAPACITY BEARINGS (Failures Unknown)
5—LARGE DIAMETER ECCENTRIC SHAFT (Failures Unknown)
6—HEAVY, WELL PROPORTIONED CRUSHER BED (Failures Unknown)
7—DEPENDABLE AND LOWER PRODUCTION COSTS (Results—Confirmed by Continued Repeat Orders)
Equipped with Bronze or Roller Bearings
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Write for Bulletins Nos. 302 and 304
300—10th St.
CRUSHER BUILDERS FOR 40 YEARS
Give us details of your crushing problems.
JOPLIN, MO.

Ferric Oxide in Cement

(Continued from page 53)

Standardization of Dichromate Solution: Weigh out an amount of Bureau of Standards sample No. 27-B that will give a titration in the desired range (we use 0.0273 grams) and place in a 100-ml. beaker. Add 10 ml. concentrated hydrochloric acid and digest on the hot plate at 80 deg. C. to 90 deg. C. until everything is in solution except a little silica. Solution may be hastened by the addition of the stannous chloride solution. However, the amount of stannous chloride solution added should not be sufficient to give a colorless solution. The solution should be a pale yellow when the sample is dissolved. This procedure will offer no difficulty to the analyst after dissolving a few samples. When the sample is in solution the sides of the beaker are washed down with a little hot water, and stannous chloride solution added, one drop at a time with stirring, until the solution is colorless. One drop is added in excess and the beaker and contents cooled by partial immersion in a pan of cold water. To the cold solution are added 10 ml. of saturated mercuric chloride and the contents of the beaker stirred for a minute. Eight to 10 ml. of the phosphoric acid reagent are added, 4 drops of indicator solution are added, and the solution titrated with dichromate until the reddish-blue color is permanent. The ferric oxide equivalent of the dichromate solution is calculated according to the equation:

$$\text{Grams } Fe_2O_3 \text{ equivalent to 1 ml. } K_2Cr_2O_7 \text{ Solution} = \frac{(\text{Wt. of Sample})\ (\%\ Fe_2O_3 \text{ in Sample})}{(\text{ml. } K_2Cr_2O_7 \text{ Solution required for titration})\ (100)}$$

One gram of the cement is weighed out and transferred into a clean dry 150 ml. beaker. Ten ml. of cold distilled water are added while swirling the beaker. This should result in nearly complete dispersion of the cement in the water, if properly performed. The swirling is continued while 10 ml. of concentrated hydrochloric acid are added and for a few seconds longer. This should result in almost complete solution of the sample. If any lumps remain they should be broken up with a stirring rod. The solution is boiled for about one minute or until solution is complete. Prolonged boiling may result in "jelling" of the silica as well as decreasing the amount of acid present.

The iron is reduced by adding stannous chloride solution to the boiling hydrochloric acid solution of the cement. The stannous chloride solution is added drop by drop with constant stirring until the yellow color of ferric chloride completely disappears. One small drop is added in excess and the contents of the beaker cooled to room temperature by setting the beaker in a pan or beaker containing cold water.

The excess stannous chloride is oxidized by adding rapidly and all at one time 10 ml. of saturated mercuric chloride to the cool solution while stirring. The stirring should be continued for about one minute to insure completion of the reaction. Ten ml. of the titrating solution and four drops of indicator solution are added. With no further dilution dichromate solution is added from a 25 ml. burette until the color changes to a red-blue. The titration is best performed over a glass "window" in the bench illuminated from below by a light in such a manner as to pass light through the solution during the titration.

Notes on Method

The percent ferric oxide is calculated according to the equation, below:

$$\%\ Fe_2O_3 = \frac{(\text{ml. } K_2Cr_2O_7 \text{ required for titration})\ (Fe_2O_3 \text{ equivalent of } K_2Cr_2O_7 \text{ solution})\ (100)}{\text{Weight of Sample}}$$

Ten ml. water and 10 ml. hydrochloric acid are ample to effect solution of the sample and should result in no difficulty unless the boiling is unduly prolonged.

Ten ml. of mercuric chloride solution is in excess of the amount required. However, the reaction between mercuric chloride and stannous chloride is *not* instantaneous, and sufficient time should be allowed for completion of the reaction. If no silky precipitate of mercurous chloride appears, insufficient stannous chloride has been used and the determination must be discarded. If the precipitate appears dark colored, too much stannous chloride has been used; the solution was too warm, or the mercuric chloride was added too slowly.

The solution should not be diluted more than that which results from washing down the sides of the beaker at the various stages of the determination. Not only the indicator color change but the rate and extent of the reaction between ferrous iron and dichromate is affected by concentration and by acidity. The conditions recommended are capable of giving accurate results on samples as low in ferric oxide as 1 percent and fair results on samples down as low as 0.3 percent.

Exactly four drops of indicator solution should be used for each determination. The indicator changes color as the result of oxidation at the expense of the dichromate solution. In other words, the indicator uses up a portion of the dichromate and the more indicator used, the higher the iron content will appear to be. A "drop" of the indicator solution will use 0.01 to 0.02 ml. of the dichromate solution. If the same amount of indicator is used for each run as for standardization, the error caused by neglecting the indicator correction should not exceed 0.01 percent ferric oxide over the range encountered in portland cements.

[9] L. A. Sarver and I. M. Kolthoff, J. Am. Chem. Soc. Vol. 53, p. 2906, (1931).

[10] Sarver and Von Fischer, Ind. and Eng. Chem., Analytical Edition, Vol. 7, p. 271 (1935).

[11] I. M. Kolthoff and N. H. Furman, Potentiometric Titrations, Second Edition, p. 277, (1931), John Wiley & Sons, New York.

Specifying Aggregates

(Continued on page 46)

1½ in. to 1 in. (20%); 1 in. to ¾ in. (10%) ¾ in. to ½ in. (10%); ½ in. to dust (20%).

These various sizes of stone are used for many purposes. Let us assume that 2½ in. to 1½ in. was being sold for railroad ballast and macadam stone, 1½ in. to 1 in. for concrete pavements, 1 in. to ¾ in. for bituminous hot mixes, ¾ in. to ½ in. for concrete curbs and sidewalks, ½ in. to dust for macadam filler. From this theoretical example it can be seen that it would be a rare case indeed where this producer, or any producer, would obtain sales of stone for these various purposes in exact amount and ratio as they were daily crushed.

In order to get some sort of balance over a year's time, producers resort to the following:

(1) If more small stone is needed, the problem is solved by recrushing the large stone.

(2) If some intermediate size is a drug on the market, say the 1½-1 in. and the 2½-1½ in., and the 1 - ¾ in. are selling fast, the producer sometimes changes his 1½ in. screen to a 1⅜ in., and the 1 in. screen to a 1⅛ in., thereby making less of this intermediate size and more of the other two sizes. This change may or may not be permissible, according to the rigidity and limitations of the particular specifications.

(3) If too much small stone is made, or it is undesirable to change the screens or recrush large sizes of stone, another solution may be to drop the price of this stone to create a demand, or else build up a market for this size.

(To be continued)

A.S.T.M. Program for Annual Meeting

(Continued from page 49)

sonry mortar and proposed specifications of mortar for unit masonry; Committee C-15 on Manufactured Masonry Units, D. E. Parsons, chairman, is offering new specifications for solid load-bearing concrete masonry units, revisions of non-load-bearing concrete masonry units, and tentative standards of sand-lime brick and concrete masonry units for catch basins and manholes.

On June 30, the Cement, Concrete, Lime, Gypsum section will hold its meetings. Committees and the chairmen reporting are as follows: Committee C-1 on Cement, P. H. Bates; Committee C-7 on Lime, James R. Withrow; Committee C-11 on Gypsum, L. S. Wells; Committee A-42 on Specifications for Plastering, W. R. McCormick; Committee C-9 on Concrete and Concrete Aggregates, F. H. Jackson; Committee C-13 on Concrete Pipe, Theodore Doll, chairman; Joint Committee on Standard Specifications for Concrete and Reinforced Concrete, A. E. Lindau, chairman.

Papers and the authors are: Specific Surface and Particle Size Distribution of Finely Divided Materials, M. N. States; Measurement of Average Particle Size by Sedimentation and Other Physical Means, Pierce M. Travis; Lean Concrete Mixes, Ernst Gruenwald; Drip Method for Testing the Relative Resistance of Concrete Exposed to Weak Acids, Dalton G. Miller, Chas. Rogers and Philip Manson; Effect of Variations in Method upon the Results of Freezing and Thawing Mortars, Bert Myers; Selection of Aggregates for Concrete Pavement Based on Service Records, Curtis Cantrill and Louis Campbell; Effect of Biot's Modulus on Transient Thermal Stresses in Concrete Cylinders, Gerald Pickett; and Thermal Volume Change and Elasticity of Aggregates and Their Effect on Concrete, T. F. Willis and M. E. DeReus.

Revise Crushed Stone Rates From New York

FURTHER REVISION of rates on crushed stone from quarries in western New York to destinations in New York, Pennsylvania and Ohio, has been ordered by the I. C. C. on further hearing of No. 27714 (Buffalo Crushed Stone Co. vs. Arcade & Attica et al) findings in the prior report that rates on crushed stone, from Bowmanville, N. Y., to destinations named in the report in New York, Pennsylvania and Ohio would be unreasonable and unduly prejudicial have been modified. A further finding is that the rates on crushed stone from Akron, Bowmansville, LeRoy, North LeRoy and Stafford, N. Y., to destinations in Pennsylvania are unreasonable and unduly prejudicial by reason of undue preference given to Cheektowaga, N. Y.

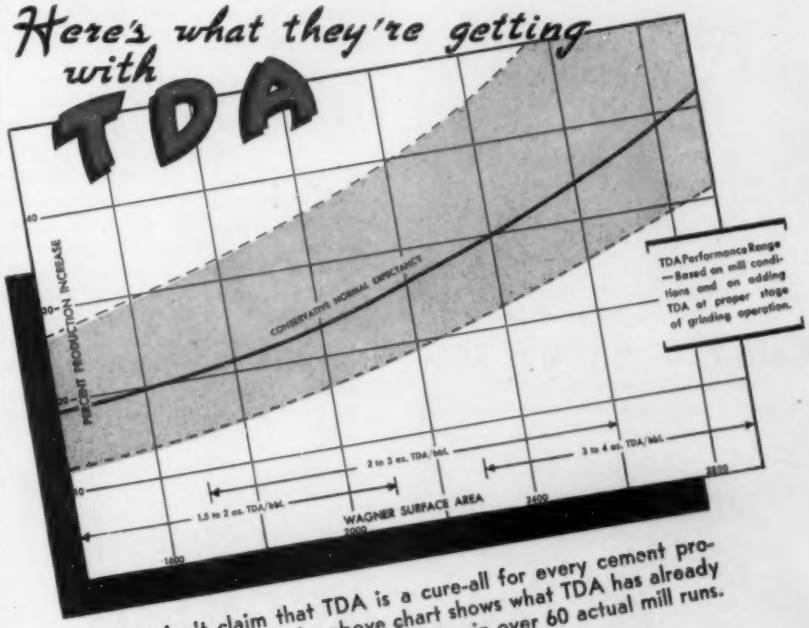
Iowa's New Plant

CENTRAL SAND AND GRAVEL CO., Iowa City, Iowa, has opened a sand and gravel pit three miles south of the city. W. R. Horrabin will serve as the business manager of the company, and F. M. Barker will be in charge of the plant. The plant is now in operation, supplying various gradations of sand and gravel.

Establish Award for Paper on Concrete

THE AMERICAN SOCIETY FOR TESTING MATERIALS has announced that Committee C-9 on Concrete and Concrete Aggregates has established the Sanford E. Thompson Award to be made annually to the author or authors of a paper of outstanding merit on concrete or concrete aggregates. The award is named in honor of the first chairman of the committee, and the purposes are to stimulate research, encourage the presentation of results of investigations that extend the knowledge of concrete.

Here's what they're getting with TDA


PERCENT PRODUCTION INCREASE
CONSERVATIVE NORMAL EXPECTANCY
TDA Performance Range —Based on mill conditions and on adding TDA at proper stage of grinding operation.
1.5 to 2 oz. TDA/bbl.
2 to 3 oz. TDA/bbl.
3 to 4 oz. TDA/bbl.
WAGNER SURFACE AREA
1600
2000
2400

We don't claim that TDA is a cure-all for every cement production problem, but the above chart shows what TDA has already done in increasing finish mill production in over 60 actual mill runs. Here are examples from three different plants:

CASE NO. 1: A plant operator grinding H.E.S. cement in open circuit increased his production 53%. He reports that, in addition, he got higher strength, greater workability, and fewer headaches.

CASE NO. 2: Another user of TDA, grinding H.E.S. cement in a closed circuit with an air separator, obtained a 28% increase in production. The efficiency of his separator was improved as well.

CASE NO. 3: A producer grinding in the low-surface-area range finds that TDA is giving him a 30% increase in production in open-circuit operation.

Maybe TDA won't do all this for you, but isn't it worth a trial?

Look at the chart again. At the fineness you're grinding you can select for yourself the average production increase you can expect with TDA in your mills. Doesn't this again justify a trial? Our engineers will be glad to cooperate in every way in discussing your particular problem. Write Dewey & Almy Chemical Company, 80 Whitemore Ave., Cambridge, Mass.

TDA

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CAMBRIDGE, MASS.
LONDON MELBOURNE OAKLAND MONTREAL

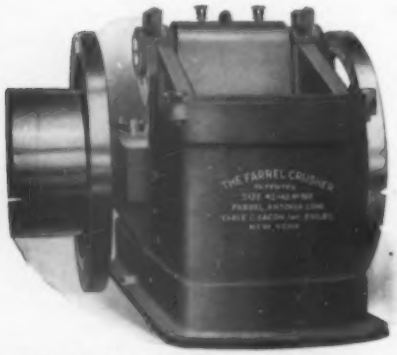
What is TDA

TDA is a mixture of triethanolamine salts and highly purified soluble calcium salts of modified lignin sulfonic acid. TDA is an excellent grinding aid. Its presence improves many of the important properties of concrete such as durability, strength and permeability.

FARREL BACON
CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service



EARLE C. BACON, Inc.
17 John St., New York, N. Y.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Basic Dolomite	$ .06¼	June 15
Lone Star Cement	.75	June 30
Monolith Portland Cem., 8% pfd.	.25	May 16
National Gypsum Corp., pfd.	1.12½	June 1
Pennsylvania Glass Sand, 7% pfd.	1.75	July 1
Southern Phosphate Co.	.15	June 30
Schumacher Wall Board, pfd.	*.50	May 15
U. S. Gypsum Co.	.50	July 1
U. S. Gypsum Co., pfd.	1.75	July 1

* Reduces accumulation to $8 a share

SIGNAL MOUNTAIN PORTLAND CEMENT Co., Chattanooga, Tenn., reports a net profit of $185,743 for the year ended December 31, 1938, before depreciation as against $164,670 for 1937. Sales for 1938 were $994,944 as against $860,580 in 1937.

•

PACIFIC PORTLAND CEMENT Co., San Francisco, Calif., showed a net income of $197,712 for the year ended December 31, 1938, compared with $401,646 for 1937. Net sales were $3,153,579 in 1938, as compared with $3,460,417 in 1937. Cement sales in 1938 were off 10.8 percent from 1937, but plaster sales were down only 1.6 percent.

•

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., reported a net profit of $205,199 before Federal taxes for the year ended March 31, 1939, as compared with a net loss of $73,356 for a similar period ending March 31, 1938.

•

ALPHA PORTLAND CEMENT Co., Easton, Penn., for the 12-month period ended March 31, 1939, showed a net profit of $441,468 as against $138,261 for the same period ending March 31, 1938. Net sales for the year ended March 31, 1939, were $6,453,343 as compared with $6,134,569 for the year ended March 31, 1938.

•

LEHIGH PORTLAND CEMENT Co., Allentown, Penn., had a net profit of $1,043,234 for the 12 months ended March 31, 1939, after federal income taxes, depreciation, depletion, obsolescence, etc., equal after deducting $227,004 dividends paid on the 4 percent convertible preferred stock to $1.08 a share on 754,434 shares ($25 par value) of common stock. This compares with 77c a common share for a similar period ending March 31, 1938.

•

DEWEY PORTLAND CEMENT Co., Kansas City, Mo., has filed a registration statement with SEC covering 100,000 shares of outstanding common stock, $15 par value, the proceeds of which will accrue to certain stockholders. The original statement filed with the commission on December 6, 1937, covered 396,420 shares of $15 par common stock, all of which is outstanding.

•

BOSTON SAND & GRAVEL Co., Boston, Mass., reports a net loss of $14,009 for the year ended December 31, 1938, after charging off depreciation, depletion, and interest. This compares with a net loss of $2504 for the same period in 1937.

•

STANDARD SILICA CORP., Chicago, Ill., had a net loss of $5703 for the year

Grips like a vise!

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Safety Wire Rope Clip

You wouldn't bet on a dog with no upper teeth! The new LAUGHLIN Safety Clip, patented, first advance in clip design for 25 years, has *two* bearing saddles • holds loose part of rope as tightly as live part. We've been making U-bolt type clips for 40 years • and still make them. But we recommend this drop forged, hot galvanized Safety Clip.

- 1. Gives 95.4% rope efficiency, not 54.4%. (U.S. Govt. Tests)
- 2. Does not crush, distort and weaken rope.
- 3. Cannot be applied incorrectly • safe . . . fool-proof.
- 4. Nuts on opposite sides mean easier and faster clipping.

• TEST IT YOURSELF. Write on business letterhead for FREE Sample of this Safer, more Efficient, more Economical Clip, endorsed by insurance companies, wire rope manufacturers and common sense.

• SEND for complete catalogue of LAUGHLIN Drop Forged Wire Rope and Chain Fittings, including Hooks, Shackles, Swivels, Turnbuckles, Links, Sockets, Thimbles and Eye Bolts.

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Manufacturers of Marine and Industrial Hardware Since 1866
PORTLAND · MAINE

ending December 31, 1938, after charging off $15,972 for shut-down expense. Net sales were $190,780 in 1938, as compared with $430,748 in 1937.

•

MARBLEHEAD LIME CO., Chicago, Ill., showed a net profit of $5468 for the year ended November 30, 1938, before deducting depreciation and depletion, as compared with $31,770 for the same period in 1937. Net sales in 1938 were $1,046,827, as compared with $1,201,782 in 1937.

•

NORTH AMERICAN CEMENT CO., New York, N. Y., for the 12 months ended March 31, 1939, shows a net loss of $750,770, after taxes, depreciation, depletion and interest, but before profit on bonds purchased, comparing with a net loss of $685,543 for the year ended March 31, 1938.

•

UNITED STATES GYPSUM CO., Chicago, Ill., reports a total profit of $14,485,400 for the year ended December 31, 1938, as against $16,754,638 for 1937. Net sales amounted to $35,143,862 in 1938, as compared with $38,345,023 in 1937.

•

FLORIDA PORTLAND CEMENT CO., Tampa, Fla., had a net income of $186,130 for the year ended December 31, 1938, before depreciation and depletion, as compared with $119,697 in 1937. Net sales in 1938 were $1,437,551 as against $1,243,713 in 1937.

•

LONE STAR CEMENT CORP., New York, N. Y., had a net profit of $647,028 for the first three months of 1939. This compares with a profit of $726,237 for the same period in 1938. Sales in the first quarter of 1939 were $4,377,799 as against $4,548,795 in the first three months of 1938.

•

ARUNDEL CORP., Baltimore, Md., had a net income of $219,314 for the first quarter of 1939, after depreciation but before federal income taxes, compared with $204,894 for the same period in 1938.

•

PEERLESS CEMENT CORP., Detroit, Mich., reports a net loss of $16,712 for the first quarter in 1939 as against a deficit of $71,798 in 1938.

•

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reporting for the quarter ended March 31, 1939, showed a net profit of $120,690, after depreciation, depletion, interest and federal income taxes, compared with $70,913 for the same quarter in 1938. In connection with its 1st 4½s, 1960, the company covenants that it will not pay any dividends on common stock or purchase or redeem any capital stock or make any distribution of assets to stockholders (other than payment of dividends on preferred stock) whenever such action would reduce consolidated net current assets to a sum less than $400,000 or reduce consolidated current assets to a sum less than twice the amount of consolidated current liabilities.

•

CONSOLIDATED CEMENT CORP., Chicago, Ill., shows a net profit of $39,572 for the year ended December 31, 1938, before depletion and depreciation. This compares with a deficit of $20,297 for the same period a year ago. Net sales in 1938 were $1,326,507, as compared with $1,386,746 in 1937.

New Florida Concern Producing Crushed Stone

ROCK PRODUCTS, Inc., Jacksonville, Fla., was organized several months ago to take over and operate the physical assets of Paving Materials, Inc. The latter concern was incorporated late in 1937 to produce crushed stone aggregate. The deposit is a man-made island of stone in the St. Johns river left from dredging by the government in the river. A ¾-cu. yd. dragline loads the stone into Ford trucks which deliver to a plant consisting in the main of a jaw crusher and revolving screens—with the finished product towed about five miles to Jacksonville.

PROPORTION BY WEIGHT

WITH POIDOMETERS

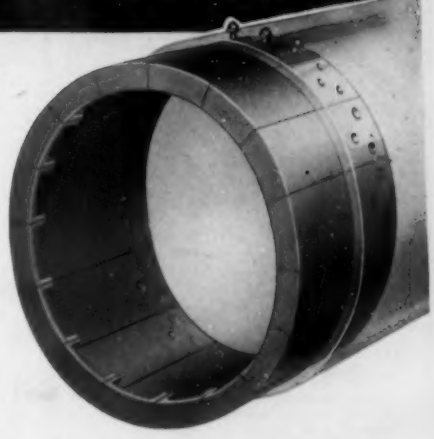
Many cement plants are using Poidometers for proportioning raw and finish materials, and also cement and hydrated lime for Masons cement. Poidometers are also being used for feeding materials to grinding mills, and coal to dryers.

The Poidometer is self-contained. The scale beam is graduated in pounds or kilos, and can be set at whatever amount of material may be required per foot of belt travel: the gate is then adjusted to suit this weight, and the machine will deliver the pre-determined amount of material with an accuracy of ninety-nine per cent.

Write for Catalog No. 2 and get complete profit-producing facts!

Schaffer Poidometer Co.
2828 Smallman St. PITTSBURGH, PA.

End Your Kiln Troubles WITH PYRASTEEL Kiln Ends



CALLING ALL CEMENT MILLS! . . . to investigate the advantages of PYRASTEEL Kiln Ends for preventing heat losses, saving fuel and improving kiln operation.

The most practical form of design has been developed by our engineers:—

Segmental Construction

consists of accurately cast unit sections of PYRASTEEL, which can be easily assembled and bolted into the end of the kiln, see illustration. Tight joints are assured and resulting coal economies run as high as 10 lbs. per bbl. of cement. Furnished for any diameter of kiln . . . write for information.

Typical segment. Units easily replaced without tearing down entire RING.

CHICAGO STEEL FOUNDRY COMPANY
KEDZIE AVE. & 37TH ST.
CHICAGO
Makers of Alloy Steel for 30 Years
PYRASTEEL for high temperatures
EVANSTEEL for strength

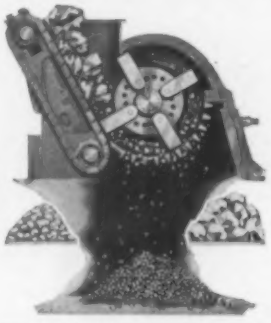
PROGRESS and LEADERSHIP
EXEMPLIFIED IN THE
NEW UNIVERSAL
VIBRATING SCREENS

Damp, Sticky Materials handled with a degree of efficiency never before thought possible. Make your next screen a UNIVERSAL. A most pleasant surprise awaits you.

Catalog on request

UNIVERSAL VIBRATING SCREEN CO.
RACINE — WISCONSIN

A New High Degree of Crushing Efficiency



More production—more profit—lower operating and maintenance costs. All these are features of DIXIE performance.

Simple in design, yet sturdy in construction, DIXIE NON-CLOG and Regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note particularly the continually moving breaker plate which means that DIXIE Hammermills will outlast and out-perform any other type.

Write for complete details on DIXIE'S 40 sizes.

DIXIE MACHINERY MFG. CO.
4109 Goodfellow Ave. ST. LOUIS, MO.

Obituaries

FRANCIS C. OWENS, district sales manager at Syracuse, N. Y. of the General Crushed Stone Co., died April 23 at the age of 48.

•

G. RAYMOND PRINCE, owner of the Prince Concrete Co., Camden, N. J., died April 17. He was 43 years of age.

•

PAUL HUYCKE, Topeka, Kan., whose main interest was with the Paul Huycke Lumber Co., which he founded and which now operates twelve yards in Kansas, died April 29 at the age of 68. Among his other interests he was a director of the Dewey Portland Cement Co.

•

JOHN W. ECKERT, cement pioneer of the Lehigh valley, died May 4 at the age of 79. Born in Allentown, Penn., Mr. Eckert made a special study of cement while attending Lehigh university and at the age of 19 wrote a thesis on the analysis of portland cement produced in the Lehigh valley as compared with cement from foreign countries. In 1877, while still in college, he became associated with the Coplay Cement Co. as a chemist, and shortly after graduation became superintendent of the company, a position he held until 1885 when with associates he formed the American Cement Co. of Pennsylvania. When the company was sold in 1898 he continued as president until 1912 when the company was reorganized and became the Giant Portland Cement Co. In 1913 Mr. Eckert retired from active business. He has been credited with the discovery that marked the beginning of the cement industry in the United States: that the limestone of the Lehigh valley closely approximates portland cement.

•

JOHN J. MARTIN, who was identified with the Edison Cement Corp. died April 17 at the age of 55.

•

BIAGIO DONIA, Linden, N. J., manufacturer of concrete block, died recently at the age of 56.

WALTER C. ANDERSON, general manager of the Southern Limestone Co., Harriman, Tenn., died May 2 from a heart attack. He was 61 years of age and in addition to his interests in the industry was twice mayor of Harriman.

•

New York Stone Producers Meet At Syracuse

CRUSHED STONE PRODUCERS of New York held a lively meeting on April 24. President H. E. Coleman opened the meeting and introduced the new secretary and engineering director, E. T. Nettleton, who told about his first impressions of conditions affecting the industry in the State. He expressed surprise at the poor condition of the highways due to misappropriation of funds, the extent of diversion of highway money, the lack of interest of motorists in the use of this money, and the apparent lack of coöperation of the various industries, associations, and highway users in a concerted plan for their mutual benefit. He said, "Our industry and allied industries were too easy-going; we were being too much of a good fellow and had permitted large powerful legislative blocs to grab off not only the cake, the frosting, but most of the crumbs as well." He submitted to the board of directors a functional chart of the aims, policies and activities by which the association might best be of service to its membership and the industry.

President Coleman next introduced J. R. Boyd, administrative director of the National Crushed Stone Association who stressed the value of the local associations as a valuable asset to the national association. Bills pertaining to dust control under consideration by the New York legislature were referred to by President Coleman who stated none of them are expected to come out of committee for action at this session. A discussion followed on various legislative topics in which the following participated: W. P. Foss, Jr., H. Barnes,

★ MANGANESE STEEL CASTINGS ★

for
CRUSHERS
PULVERIZERS
ROLLS
SCREENS

for
SHOVELS
DREDGES
CRANES
CONVEYORS

The Frog, Switch & Mfg. Co.
Established 1881 CARLISLE, PA.

O. Graves, H. E. Coleman, and others.

The following were in attendance: Buffalo, Crushed Stone Co., A. J. Hooker, F. W. Schmidt, and James Savage; Bero Engineering & Construction Co., James R. Bero; Dolomite Products Co., H. W. Barnes and Harvey N. Clark; Federal Crushed Stone Corp., H. E. Rainer; General Crushed Stone Co., O. M. Graves, F. F. McLaughlin, B. P. Rex, Geo. Schaefer, and A. G. Seitz; Jointa Lime Co., H. J. Russell; Le Roy Lime & Crushed Stone Corp., H. E. Coleman; New York State Crushed Stone Association, E. T. Nettleton; New York Trap Rock Corp., Wilson P. Foss, Jr., and Stirling Tomkins; Northern Quarries, W. F. Borrman; Wickwire-Spencer Steel Co., W. D. Harrington; Hercules Powder Co., W. A. Anderson and H. H. Hearon; Screen Equipment Co., R. S. Hunt; W. S. Tyler Co., Bryant Currier; and J. R. Boyd, National Crushed Stone Association.

Sand-Lime Brick Production and Shipments

SEVEN active sand-lime brick plants reporting for April and ten for March, statistics for which were published in May.

Average Price for April

	Plant Price	Delivered Price
Detroit, Mich.	....	$16.00
Milwaukee, Wis.	$10.00	12.50
Mishawaka, Ind.	10.50	....
St. Louis Park, Minn.	8.50	10.00
Syracuse, N. Y.	14.00	16.00 C/L 20.00 L/C

Statistics for March and April

	March†	April‡
Production	1,489,275	1,147,250
Shipments (rail)	112,000	105,000
Shipments (truck)	1,837,948	1,364,477
Stock on hand	1,272,194	530,043
Unfilled orders	2,590,000	1,917,294

†Ten plants reporting: incomplete, one not reporting production, two not reporting stock on hand, and five not reporting unfilled orders.

‡Seven plants reporting: incomplete, one not reporting production, three not reporting stock on hand, and three not reporting unfilled orders.

Fire-proof Plaster

THE MELLON INSTITUTE of Industrial Research, Pittsburgh, Penn., has announced the development of a new lightweight protective covering designed particularly as a safeguard for steel beams which buckle when exposed to prolonged, intense heat. The discovery consists of an expanded vermiculite and gypsum composition. It has been given an official fire resistance rating of five hours and 44 minutes by the National Bureau of Standards, according to the Institute.

Resume Operation of Plant Damaged By Blast

COLORADO PORTLAND CEMENT CO., near Fort Collins, Colo., resumed operation on May 1, according to Ira J. Dilts, superintendent. A full crew of men has been employed since the explosion on January 30, repairing the plant, and deliveries of cement have continued from warehouses, which were full at the end of January.

Diesel Tow-Boat for Marquette Cement

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has ordered a twin-screw, Diesel-powered tow boat from the Marietta Manufacturing Co., which will cost approximately $250,000. The craft will be named the Nicholas Duncan, and will be put in service on the Illinois and Mississippi rivers.

Concrete Pavement Yardage

AWARDS of concrete pavement for April, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during Apr.	Total sq. yds. during first four months
Roads	2,081,278	5,711,877
Streets and Alleys	1,304,093	4,251,892
Airports	....	195,563
Totals	3,385,371	10,159,322

Made of Acid Open Hearth Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

The Service Record of this wire rope continues to make and hold friends.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.
Established 1857

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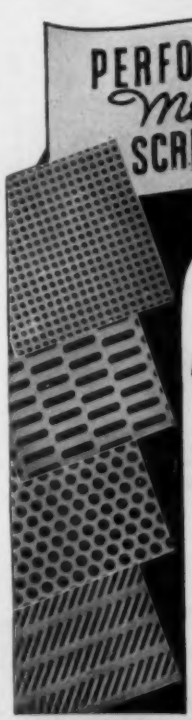
PERFORATED *Metal* SCREENS



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Any SHAPE
Any METAL
Any PERFORATION

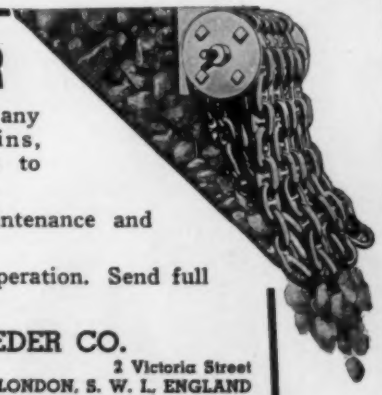
You can safely specify H & K screens and be assured of maximum screening results. Quality both in material and workmanship is always a first consideration.

Write for prices.

The Harrington & King PERFORATING Co.

5650 Fillmore St., Chicago—114 Liberty St., N. Y.

THE ROSS FEEDER



Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.

19 Rector Street
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LONDON, S. W. 1., ENGLAND

Prices Bid - Contracts Let

BELLEFONTAINE, OHIO: McKinley and Brugler, Big Springs; Mrs. Elizabeth Hempy, Rushsylvania; and the Bellefontaine Development Co. submitted identical bids for supplying the city street department with 1500 tons of crushed stone. They were $1.20 per cu. yd. delivered or 90c at the quarry.

•

HAYWOOD AND TRANSYLVANIA COUNTIES, N. C.: Low bidders for work on Blue Ridge Parkway were as follows:, 1260 cu. yd. stone and gravel sheathing at $1.00 per cu. yd.: Albert Bros., Contractors, Inc., Salem Va.; Ralph E. Mills Co., Frankfort, Ky.; and E. W. Grannis, Fayetteville, N. C.; 28,600 tons crushed stone for surfacing at $1.15 per ton: T. M. Strider & Co., Nashville, Tenn.; and 1000 tons crushed stone in stockpiles at $1.15 per ton: T. M. Strider & Co., Nashville, Tenn.

•

PETALUMA, CAL.: M. Vonsen Co. was awarded a contract for 626 sacks of cement in cloth bags at 63c per sack and Captain L. Lorentzen was awarded a contract for approximately 562 tons of coarse and fine gravel at $1.60 per ton, the materials to be used for the Thompson creek concrete drain tube continuation project.

•

SEYMOUR, IA.: Concrete Materials Co., is selling agricultural limestone from its McNair quarry at 99c per ton plus a trucking charge averaging 3c per ton per mile. All surplus agstone manufactured and not delivered during operation of the pulverizer will be stock piled. The cost from the stockpile, however, will be 10c per ton higher because of the additional labor required in loading the trucks.

•

LITTLE ROCK, ARK.: Contract for materials to pave the route of the former South Main street car line was awarded to the Big Rock Stone and Material Co. as follows: ready-mixed concrete, $6.50 per cu. yd.; sand, 65c per cu. yd.; and cement, 66c a sack.

LIMA—THE WAY TO *Low Cost* PERFORMANCE

LIMA 2 Yard Shovel working at Conchas Dam, New Mexico.

Users of shovels, draglines, cranes and clamshells, who watch their costs take no chances with slow, obsolete machines. They use LIMA excavators and are getting lowest cost per yard performance. Make your next excavator a LIMA and get more value for your money.

LIMA LOCOMOTIVE WORKS, INC.
SHOVEL and CRANE DIVISION
LIMA, OHIO, U. S. A.

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Newark, N. J.
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Dallas
1306 McKinney Avenue
Memphis
77 McCall Street
San Francisco
235 Bayshore Boulevard
Los Angeles
2061 Santa Fe Avenue
Philadelphia
1744 Sedgley Avenue
New York
167th Street and Sedgwick Ave.

LIMA

SHOVELS — DRAGLINES — CRANES — CLAMSHELLS

Open Cement Bids For Shasta Dam

BIDS have been opened by the Procurement Division of the Treasury department on cement to supply the Shasta dam requirements. Covering all or part of the 1,400,000 bbl. needed in 1940, the Riverside Cement Co. offered $1.07 per bbl. for 610,000 bbl. and the California Portland Cement Co. offered $1.14 for 500,000 bbl. For the full amount a joint bid of $1.38 to $1.65, depending on the rate of delivery, was offered by the Beaver Portland Cement Co. in the names of six companies, which includes Pacific Portland Cement Co., Calaveras Cement Co., Monolith Portland Cement Co., Santa Cruz Portland Cement Co., and the Yosemite Portland Cement Co.

For the entire 5,800,000 bbl. needed for the dam the six companies submitted a bid of $1.46 to $1.65 and the Permanente Co., Simla, Calif., which plans to build a mill if it receives the contract, bid $1.19.

Cement Statistics Show Increased Production

LATEST FIGURES available from the Bureau of Mines show that the portland cement industry is continuing its rapid gains in production over a year ago. The coal strike may later be reflected in production figures for May, but March production continued at a high level. In March, 1939, the portland cement industry produced 8,171,000 bbl., shipped 8,467,000 bbl. from the mills, and had in stock at the end of the month, 23,796,000 bbl. Production and shipments in March, 1939, showed increases of 39.0 and 16.6 percent respectively, as compared with March, 1938. Portland cement stocks at mills were 3.5 percent higher than a year ago.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 160 plants at the close of March, 1938, and 161 plants at the close of March, 1939.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	March 1938	March 1939	Feb. 1939	Jan. 1939	Dec. 1938
The Month	26.9	37.4	27.9	24.3	36.9
12 Months	42.7	42.8	41.9	41.3	41.0

Safety Trophy to Stone Company

BASIC DOLOMITE, INC., Maple Grove, Ohio, was recently awarded first place in the state-wide Lime Burners No-Accident Campaign of the Ohio Finishing Lime Producers Association. The award was made at the April 19 meeting of the Quarries, Cement and Lime section of the All-Ohio Safety Congress in Columbus. This lime plant won the contest for the six-month period with an accident frequency rate of 2.9 per million man-hours of work. Eight other lime plants were entered. The Ohio Hydrate Supply Co., Woodville, Ohio, was runner-up in the contest.

Struggle For Control

PACIFIC PORTLAND CEMENT CO. (San Francisco, Calif.) in giving notice of the adjourned annual meeting, scheduled for June 2, named A. H. Canvin, J. H. Colton, William F. Humphrey, Harry C. Hunt, J. A. McCarthy, Herbert F. Rawll and John G. Sutton as a committee to solicit stockholders' proxies. "The board of directors has designated [these] stockholders to solicit your proxies," the letter says, "and this group favors the retention of the present management, which has been in charge of its operations ever since its origin. This group of stockholders collectively owns or controls more than 25 percent of the outstanding stock."

Of the proxy committee named, all except Messrs. Colton and Rawll are now members of the directorate.

Named by John D. McKee, a dissenting stockholder, as nominees for directorates are Wakefield Baker, Benjamin R. Boutell, Ira C. Copley, Charles Elsey, Herbert Fleishhacker, Jesse B. McCargar and John D. McKee. Messrs. Copley, Fleishhacker and McKee are now members of the board. "It is hoped," Mr. McKee's letter says, "that enough proxies will be given to permit the election of all of these gentlemen as directors."

Under California law, voting for directors of a corporation is on a cumulative basis. This permits a stockholder to spread his votes evenly between a designated number of directors or to vote all his votes for one or more nominees. Effect of this provision is to allow a minority to elect board members in proportion to the minority interest represented. With 11 members to be elected to the board, one-eleventh of the total outstanding stock could elect one director.

On this basis, the proxy holdings recorded for Mr. McKee at the special meeting last December would permit him to name about five directors, or two more than are now represented by his list of nominees. A like number would be elected by proxies running to the company, on the basis of December's proxies, and the remaining director would be elected by the stock represented in person at the meeting. Count of proxies at the December meeting showed a total of 50,986 preferred and common shares running to the company, 50,484 to Mr. McKee and 18,647 represented in person. On this basis, about 10,920 shares would be required for election of each director.

Pump Data Book

PRACTICALLY any question that may arise in the selection and operation of a pump is answered in the 256-page Pump Data Book recently revised by Economy Pumps, Inc., Hamilton, Ohio. It contains 148 pages of engineering data and 108 pages of pump listings, and is profusely illustrated with engineering curves, cross sectional drawings of various types of pumps and pump installations, and halftone views of the pumps and the services in which they are used. Some of the subjects covered in this book are as follows: effect of changing speed on capacity, head and horsepower; operation of pumps in series or parallel; how to figure pump horsepowers; measurement of water with discharge through weirs and nozzles; proper arrangement of pump suction piping; cost of pumping water at various heads; and kinds of electric motors for driving pumps.

Horsepower Rating Tables for Leather Belting

THE AMERICAN LEATHER BELTING ASSOCIATION, New York, N. Y., is now distributing a four-page circular of tables showing Horse Power Ratings For Oak Tanned Flat Leather Belting. These tables were approved by the engineering committee of the American Leather Belting Association and officially adopted by the association on December 7, 1938. These tables are based on the performance of the belting, and "are not based on one particular authority's theory, but are a correlation of scientifically measured tests and field data," states L. H. Skougor, research engineer of the association.

Portable Crushing Plant for Highway Job

JEFFERY-KEYS SAND AND GRAVEL CO., Batesville, Ark., is now operating a portable rock crushing plant about 10 miles south of Batesville which will produce crushed stone and pulverized limestone for agricultural purposes. The company also has the contract for furnishing crushed stone for the four-mile extension of black-topping on Highway 11, on which the plant is located, according to Carl Keys, manager.

FOR RAPID HAULAGE OF QUARRY CARS

A single drum

AMERICAN

General Purpose Hoist

Electrically operated, hauls 4300 pound trams of limestone up the 350 foot, 11 degree incline shown above at a speed of 150 feet a minute.

For a very modest outlay the owners of this installation are cashing in a very fine return.

Let us tell you just how little the ultra-modern AMERICAN General Purpose Hoist costs and what it can do to make money in quarry, cement plant, gravel pit.

Write Dept. RP for Catalog 100-H-1.

American Hoist and Derrick Co.
Saint Paul, Minn.

AMERICAN TERRY DERRICK COMPANY
South Kearny, N. J.

Branch Offices
NEW YORK & CHICAGO

Amend New York Bill On Buying of Aggregates

A BILL removing the requirement that the town superintendent of highways purchase stone or gravel within their townships, introduced this session of the New York legislature by Assemblyman Theodore Hill, Jr., of Jefferson Valley, N. Y., has been amended to apply only to the towns of Somers, North Salem, Lewisboro, and Poundridge. The bill is now in the committee on internal affairs. As originally introduced, the measure exempted all town superintendents of highways from the requirement. This amendment was made, it was explained, because there are no adequate supplies of stone and gravel in these towns. Mr. Hill's proposal excludes the four towns from the regulation limiting to $1,000 the price of purchase of land "containing a gravel bed or other material for use on the public highways and bridges of the town," and adds a provision that "no such land shall be resold to any private corporation."

Work Progressing On Lake Storage and Packing Plants

TWO CEMENT COMPANIES have been active recently in the construction of bulk storage and packing plants at Lake Michigan ports. Universal Atlas Cement Co. is completing a storage plant at Green Bay, Wis., consisting of five concrete silos, having a capacity of 120,600 sacks. In addition to this plant, Universal has started construction of a similar unit at Muskegon, Mich.

The Medusa Portland Cement Co., Cleveland, Ohio, has completed the construction of nine silos and the necessary packing buildings at Holland, Mich.

THE INDUSTRY

Quaker City Rubber Co., Philadelphia, announces the following changes in personnel: R. S. Wharton, general sales manager to vice-president in charge of sales, replacing F. C. Millhoff, who has retired; G. C. Johnson, manager of the Chicago branch to general sales manager; and H. C. Heine to manager of the Chicago branch with N. Asbridge as assistant.

Hercules Co., Marion, Ohio, has appointed the Fletcher Equipment Co., Inc., 309 Magazine Street, New Orleans, La., and the United Sales Corp., 7630 Meade Street, Pittsburgh, Penn., as distributors of Hercules road rollers in their territories.

Cleveland Tractor Co., Cleveland, announces that H. P. Mee has been elected executive vice-president. Mr. Mee returns to the tractor industry after a two years' retirement. He became treasurer of the Caterpillar Tractor Co. when it was organized in 1925, and advanced successively to secretary-treasurer, vice-president and treasurer, vice-president in charge of sales, and finally to vice-president in charge of sales, service and advertising.

Harnischfeger Corp., Milwaukee, Wis., announces the appointment of W. G. Dixon and Associates, located at 1218 Olive Street, St. Louis, Mo., as the new agent for all P & H excavators, cranes, hoists, welders and electrodes.

United States Rubber Co., Cleveland, Ohio, has appointed Willard H. Cobb, for the past several years general factory manager, to general manager of the mechanical goods and general products division.

Robins Conveying Belt Co., New York, N. Y., reports that R. W. Eichenberger, vice-president, who formerly acted as manager of the Chicago office, has been transferred to the New York office, where he will collaborate in general sales management with H. Von Thaden, president.

Buell Engineering Co., New York, N. Y., and **B. F. Sturtevant Co.**, Hyde Park, Boston, have completed arrangements whereby the Sturtevant field organization, operating out of the forty Sturtevant offices, will parallel the work of the Buell service staff, thus greatly increasing service facilities on Buel Dust and Fly Ash Collectors throughout the country.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces the appointment of Walter Geist as vice-president. Mr. Geist entered the employ of the company in 1909 as an errand boy and has progressed through various positions and departments in the company. Through his interest in his work he originated the idea of the Texrope drive.

Hardinge Co., Inc., York, Penn., reports that A. C. Bittner, manager of its service department for 19 years, died on April 22 at the age of 57.

James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, has published in a 1408-page book, which sells for $1.50 per copy, the outstanding papers of the recent $200,000 Award Program for original studies on welding.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn., announces that Marvin W. Smith has been elected a vice-president of the company. He has been manager of engineering since May 7, 1936 and will now direct all the company's engineering activities. Mr. Smith has been associated with Westinghouse since he left college in 1915.

Industrial Brownhoist Corp., Bay City, Mich., reports that Melvin Pattison has resigned as president and treasurer to become chairman of the board of directors. Hoyt E. Hayes, vice-president, was elected president and treasurer and James B. Hayden, assistant sales manager, was appointed sales manager.

AGAIN

A KERN RADIAL STORAGE SYSTEM HAS BEEN CHOSEN TO REDUCE OPERATING COSTS

INSPECT

THE NEW PLANT DESIGNED FOR THE LINCOLN SAND AND GRAVEL COMPANY AT LINCOLN, ILLINOIS

BY THE

P. O. Box 2057 **FRED T. KERN CO.** Milwaukee, Wis.

NEW LITERATURE

About Your Business

The following literature, recently published, is available free, upon request:

Cement Plaster.—Mikolite Co. A circular describes and illustrates the advantages and various applications of Mikolite insulating cement plaster, acoustical plaster and insulating cement roof.

Combustion Control Equipment.—Leeds & Northrop Co. The application of Metermax combustion control to boiler furnaces of every major type is featured in a new 32-page catalog, N-01-163.

Compressors and Diesel Engines.—Worthington Pump and Machinery Corp., has issued a number of interesting bulletins. Number H-850-B52 is about Worthington portable, gasoline driven compressors; H-850-B56 describes its Aero 2 stage, full-Diesel drive, portable compressors; and S-600-B5E deals with its vertical, four-cycle, direct-injected Diesel engines.

Concrete Mixers.—Chain Belt Co. has published a new catalog No. 340 on the Rex Moto-Mixer. It explains in detail the mechanics and operation of the new 1939 Moto-Mixer and is profusely illustrated with views showing the mixer in action.

Concrete Units.—The Cemenstone Corp. has issued three bulletins describing the manufacture, application, and method of installing Cemenstone block, slabs, and precast curbing.

Crushers.—Allis-Chalmers Mfg. Co. Bulletin No. 1469-E entitled "Newhouse Capacity, High Efficiency Reduction Unit" describes and illustrates with installation views the various features of the Newhouse crusher.

Crushers and Crushing Plants.—Universal Crusher Co. has brought out a new 12-page folder, No. SF 39, which pictures and describes Universal's new line of weight-saving "streamlined" portable crushing units as well as many types of stationary and portable plants.

Drill Steel Sharpener. — Ingersoll-Rand Co. An attractive bulletin, Form 2176, describes the company's line of rock drill steel sharpeners and oil furnaces.

Eye Protection Equipment.—Mine Safety Appliances Co. has just published an interestingly-designed 8-page bulletin CE-8 on M. S. A. eye protection equipment.

Furnace Refractories.—McLeod & Henry Co., Inc. has brought out a new catalog on refractory materials and designs for all kinds of furnaces.

Head and Eye Protection.—Chicago Eye Shield Co., has issued a new 48-page catalog which describes their line of goggles, respirators, spectacles, masks, welding helmets, and other safety devices.

Mechanical Rubber Goods.—Quaker City Rubber Co. has issued a folder entitled "Even on the Tough Contracting Jobs." It is profusely illustrated with views of the various Quaker rubber products in use under difficult operating conditions.

Plant Equipment.—Jeffrey Manufacturing Co. has ready for distribution a new 960-page general catalog No. 87, containing valuable information on its complete line of conveyors, elevators, chains, electric vibrating feeders, screens, coolers, crushers, portable loaders and conveyors, etc.

Refractories. — Harbison-Walker Refractories Co. has brought out a folder describing the composition, special properties and uses of the various brands of refractory brick manufactured at its southern works.

Sand and Gravel Pumps.—Kansas City Hay Press Co. has issued a booklet giving details of construction, actual applications, and power and capacity ratings of its pumps.

Speed Reducers.—Stephens-Adamson Mfg. Co. Catalog No. 7838 gives complete engineering information on its speed reducers.

Steam Turbines.—Westinghouse Electric & Mfg. Co. Comprehensive information on the application and selection of steam turbines is contained in a new 48-page booklet, B. 2198.

Tractors.—R. G. Le Tourneau, Inc., is now publishing a bi-monthly organ called the **Co-Operator** for the benefit and aid of the man on the tractor seat. It includes hints and ideas on how to move more dirt cheaper, how to do hard jobs easier and better, and how to service equipment so as to reduce maintenance and delay.

Tunnel-scrapers.—Sauerman Bros., Inc., has issued bulletin No. 151, explaining the general scope of the tunnel-scraper system in relation to problems of reclaiming bulk materials stored either on the ground or in buildings.

Universal Joints. — Mechanics Universal Joint Division of Borg-Warner Corp. has issued a new catalog, Ind. 1939, about its roller bearing universal joints and flexible drive shafts. The catalog also includes two pages of interesting general engineering data on drive shafts which the firm states is not available in any engineering hand books.

Welding Protective Equipment.—Lincoln Electric Co. has issued an informative bulletin No. 359 on the forms of radiant energy encountered in welding operations, their properties, hazards from exposure to them, and the means of protection from such exposure.

Wire Rope.—Macwhyte Co. has just published a single page bulletin on "Why Corrosion Shortens the Life of Wire Rope," which tells comprehensively when, where, and how corrosion strikes and how to prevent it.

New Incorporations

The Bluewater Corporation of Alberquerque is the name of a new Alberquerque, N. Mex., lime company with an authorized capital stock of $25,000. Incorporators are B. H. Holmes, H. S. Peed and W. E. Grimer.

Contee Sand and Gravel Co., Inc., Laurel, Md., has been granted a charter. Capital stock is 100 shares, no par value, and incorporators are Abraham Gudelsky, Ida Gudelsky, and Harry Gudelsky.

Tar-Rock Co. is the name of a new Bowling Green Ky., corporation with a capital of $500,000. It is to take over the properties of the defunct United Rock and Diamond Rock Asphalt Companies of Bowling Green, including the Overall and Owen 16,000-acre lease of asphalt lands and the defunct companies' loading stations on the banks of Barren river in Delafield. Incorporators are Garland D. Sledge, Rodes K. Myers, J. F. Eggleston, John T. Adams and Coleman Taylor.

Jeffery-Keys Sand and Gravel, Inc., Batesville, Ark., has filed articles of incorporation. Authorized capital stock is 1000 shares, valued at $50 each and incorporators are Ray N. Jeffery, Carl A. Keys, and C. O. Meade.

Central Sand & Gravel Co., Inc., Needham, Mass., has been granted a charter with a capital of $100,000. Incorporators are Howard W. Gould, president; Charlotte M. Gould, clerk; Ernest W. Starratt, Jr., treasurer; and Pearl L. Stanley.

Wisconsin Dunbrik Corp., Appleton, Wis., has been granted a charter. Capital stock is 45 shares of common at $100 each and 200 shares of preferred at $100 each; incorporators are Tom M. Armstrong, Jos. C. Hantschel, and John T. Krogh.

Air City Concrete Co., Dayton, Ohio, has been incorporated by Harmon W. Ayers, Lena L. Ayers, and George W. Heck with 500 shares and $1000 capital.

Thornton Quarries Corp., 33 N. La Salle Street, Chicago, Ill., has been granted a charter with a capital of 50,000 shares par value at $1 a share; 1680 par value preferred at $100 a share, class A; and 2320 shares par value at $100 a share, class B preferred. Correspondent is Schradzke and Johnssen.

Maloh Gravel & Paving Co., Cleveland, Ohio, has been incorporated by Perry L. Graham, Norman L. Dungan, and Virginia Hofrichter with a capital of 250 shares, no par value.

Stengel Block Co., Jefferson, Wis., has been incorporated by Harold, Charles and Robert Stengel and Wm. Brandel with a capital of 60 shares at $50 each.

Mitchell Rock and Sand Co., Sioux Falls, S. D., with a capital stock of $25,000, has filed articles of incorporation. Directors are Casper L. Althen, Robert E. Coyne, John J. Stephens, S. H. Bruyn, and Hans Hanson.

Ready-Mix Cement Co., Davenport Ia., has filed articles of incorporation. Capital stock is set at $25,000, divided into 2500 shares at $10 each. C. A. Mainwaring is president and treasurer, Fred O. Blick is vice-president and R. B. Swift is secretary. The company already has six mixer trucks in service.

Ready-Mixed Concrete Co., Ltd., Staunton, Va., has been formed as a "limited partnership" by J. Aubrey Potter, John O. Snyder, and Gilpin Willson, Jr. The amount of cash and any agreed value of other property contributed by each limited partner is $700 in money and no "other property."

Inland Lime & Stone Co., Milwaukee, Wis., has been formed by the Inland Steel Co., Chicago, Ill., to sell crushed stone for construction work and fluxing stone for foundries. Stone from the steel firm's quarries at Manistique, Mich., will be shipped to Milwaukee by water. Charles H. Weymier will be in charge of operations.

Lake Shore Sand and Gravel Co., Kenosha, Wis., has been organized by John Kraak and William Ashmus. The company has a $15,000 plant which dredges stone and sand from Lake Michigan, crushes, washes and screens it into four grades of product. The two men have leased a five-acre tract south of Kenosha on what was formerly Edithton Beach.

Eastern Concrete Pipe Corp., New Haven, Conn., has been granted a charter with a capital of $50,000. Incorporators are William J. Smith, George J. Smith and George A. DiCenzo.

National Concrete Co., Seminole, Okla., has been incorporated by J. L. White, F. G. Sarber, and W. J. Albright. Capital stock is $25,000.

Damage Suits Cause Foreclosure

EVERTON SILICA SAND CO., INC., Harrison, Ark., has been sold at public auction to Mrs. D. D. Dunkin for $17,000. Mrs. Dunkin and her associates own and operate the Silica Products Co., Inc., Guion, Ark. The company had enjoyed a rapid development since its formation in 1935 but its financial standing had been crippled by several personal injury lawsuits. It is expected that the plant will continue in operation.

Charge Discrimination Against Gravel

COUNTY COMMISSIONERS meeting at Pittsburgh, Penn., issued a statement that there had been no discrimination against gravel. The complaining companies were the J. K. Davison Co., the Dravo Corp., Iron City Sand and Gravel Co., West Penn Sand and Gravel Co. Sand and gravel companies had requested that county specifications requiring crushed stone be changed to gravel. In answering the complaint, Works Director John F. Laboon said that last year 80,000 tons of gravel had been used, against 51,000 tons of stone. He estimated that 150,000 tons of gravel would be used this year.

New Rock Wool Concern

STANDARD LIME & STONE CO., Baltimore, Md., has announced the appointment of the Capitol Insulation Co. of Northern Ohio, Woodville, Ohio, as its franchised contractor for the sale of rock wool. C. W. Schwind has been appointed sales manager of the new rock wool sales company.

Trends As Evidenced By Purchases

THE NORTHERN BLOWER CO., Cleveland, Ohio, has announced the following recent installations of dust collecting equipment in addition to those previously mentioned in ROCK PRODUCTS:

LOUISVILLE CEMENT CO., Speed, Ind.—Complete dust collecting system in connection with No. 6 kiln stack, consisting of two Norblo type H.E.L.S. collectors with a capacity of 70,000 c.f.m.; dust collecting system for dryer stack, comprising one Norblo H.E.L.S. collector, capacity 30,000 c.f.m.

LEHIGH PORTLAND CEMENT CO., Fogelsville, Penn., plant.—Automatic dust collecting system for crusher building, including No. 50 Norblo fan, capacity 12,000 c.f.m., and automatic dust collector for dryer building, including No. 45 Norblo fan, capacity 9000 c.f.m. For Union Bridge, Penn., plant.—Automatic dust collecting system for crusher house, including No. 60 fan, capacity 14,000 c.f.m.; automatic dust collecting system for finish mill, including No. 60 Norblo fan, capacity 14,000 c.f.m.; automatic dust arrester to be used in connection with B. & W. mill, raw grinding department, capacity 10,000 c.f.m.

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill.—For Cape Girardeau, Mo., plant, automatic dust collecting system for secondary crushing department, consisting of No. 50 S.S. fan, capacity 12,000 c.f.m., and also installation for raw mix control, including eight Norblo automatic air filters and No. 60 fan, capacity 11,000 c.f.m.

MISSOURI PORTLAND CEMENT CO., Prospect Hill, Mo., plant.—For cement pumping and loading station, a standard Norblo dust collector, including a No. 45 Norblo fan, capacity 7000 c.f.r

RIVERSIDE CEMENT CO., Riverside Calif. —Four complete dust collecting installations, consisting of Norblo auto matic dust arresters, including four No. 60 fans. Installations were made in the raw grinding department blending bins and silos, total capacity 45,000 c.f.m.

Gypsum Plant Addition

UNITED STATES GYPSUM CO., Chicago, Ill., will erect a $130,000 addition to its New Brighton, N. Y. plant. Completion of the new building will make available more space for the storage of sheetrock and rock-lath products. The two-story structure will span the Staten Island Railroad tracks.

Ready Mixed Concrete Activities

FARMINGTON CONCRETE PRODUCTS CO., near Bloomfield, Iowa, will manufacture ready mixed concrete, concrete blocks, joists, and other units. Aggregates will be obtained from the Farmington Gravel Co. O. L. Graham is manager of the company.

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DALTON COAL CO., Columbia, Mo., has started to produce ready mixed concrete in addition to concrete block manufacturing activities.

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THE CITY OF OSWEGO, N. Y., is now erecting a central concrete mixing plant, according to Commissioner of Works J. Francis Gill. A weigh batcher and steel bins have been purchased.

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S. E. WILLEY, INC., is the name of a new concern which will establish a ready mixed concrete plant at the former James N. Dugan gravel pit property on Wooster Pike, near Cincinnati, Ohio. Mr. Willey is secretary-treasurer of The Willey-Ruckstuhl Co., Cincinnati, Ohio, sand and gravel producers. The plant includes 40 acres of land, a tipple, crusher, screen and washing equipment, derrick boat, dump bottom steel scow and tow boat. Mr. Willey will be in charge of the property.

Sand and Gravel Shorts

A. T. DOLAN, Tillamook, Ore., contractor, has built a gravel plant near the Mills bridge on the Wilson river.

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STONE SAND AND GRAVEL CO., Dayton, Ohio has been named in a suit for a receivership recently filed by Stockholders Realization Corp., and A. W. Schulman. The defendant concern has been substantially abandoned and dissolved some time ago, the petition alleges.

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FIRE recently destroyed a comparatively new dredge owned by the Northern Gravel Co., Muscatine, Iowa. Lightning is believed to have been the cause of the fire. The loss, estimated at $30,000, included two Diesel engines, fuel oil, pumps, and auxiliary equipment, and was covered by insurance.

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ABSECON, N. J., city council passed an ordinance making it unlawful to open up a gravel pit in the city without first obtaining a permit. The fee for the permit is $25, and the application must be in writing and accompanied by a map of the place to be excavated.

Award Watches for 25-Years' Service

MEDUSA PORTLAND CEMENT CO., Bay Bridge, Ohio plant, awarded five employes with watches for 25 years of service at the annual employes dinner. A total of 41 employes have received these awards. The men who received the watches were Bert Wahl, Albert Sengstock, William Brahl, Louis Leidorf and Gabriel Brunner. Nearly all the officers of the company were present, including J. B. John, president; P. G. Dawson, vice-president; H. H. Vanderwerp, vice-president in charge of production; Fred Pickford, secretary; William Mooney, sales engineer; A. T. McCormick, general sales manager; E. S. Rogers, Jr., assistant sales manager; C. E. Wyman, manager of specialty sales; F. C. Carstens, purchasing agent; and William Powell, safety director.

Open Colorado Quarry

COLORADO FUEL & IRON CORP., Pueblo, Colo., has resumed operations at its dolomite quarry near Soda Point. T. J. Quinn, veteran quarry superintendent of the company, will be in charge of operations. Opening up of the quarry was necessitated by increased steel orders at the Pueblo plant and by a general pick-up in business.

first internal combustion engines ALLOWED ON TUNNEL WORK

Because the exhaust proved to be free of poisonous carbon monoxide . . . the New York City Tunnel Authority and the State Dept. of Labor gave the Woodcrest Constr. Co., and Rosoff Bros., Inc., permission to use Cummins Diesel-powered trucks in the Queens Midtown Tunnel. This was the *first time* any internal combustion engine had been allowed in New York tunnel construction jobs. Cummins Diesels speeded up the job by saving an extra handling of the muck—by coming up out of the tunnel faster. In addition, Cummins dependability assured the contractor he would finish the job on time. We have prepared a bulletin giving the whole story. We'd be glad to send it to you FREE. Use the coupon. Cummins Engine Co., 3816 Wilson Street, Columbus, Indiana.

This truck, powered by a Model HB-4 cylinder Cummins Diesel, is leaving the north portal of the Queens Midtown Tunnel and is starting up a 16 percent grade with 14 tons of muck. 14 of these Cummins-powered trucks mucked the tunnel in record time.

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Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Co.
Jeffrey Mfg. Co.
Leschen, A., & Sons Rope Co.
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Hetherington & Berner, Inc.

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Thew Shovel Co.

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Chain Belt Co.
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Robins Conveying Belt Co.
Thermoid Rubber Co.

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Link-Belt Co.
Smidth, F. L., & Co.
Thermoid Rubber Co.

Belting (V Type)
Allis-Chalmers Mfg. Co.
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Robins Conveying Belt Co.

Belt Idlers
Jeffrey Mfg. Co.
Link Belt Co.
Robins Conveying Belt Co.
Smith Engineering Wks.

Belt Lacing
Flexible Steel Lacing Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

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Robins Conveying Belt Co.

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Multiplex Concrete Machy Co.
Stearns Mfg. Co.

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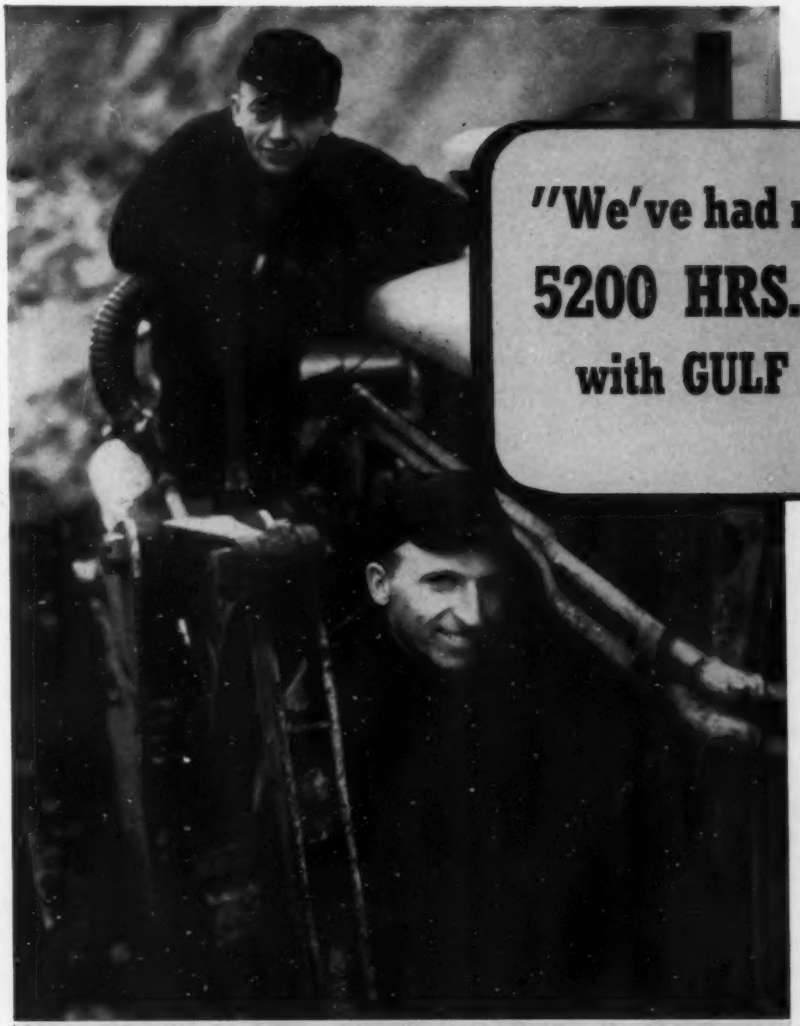

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● On this road job in south central Kansas—Stamey & Tidd, Contractors—the Gardner-Denver UMB Wagon Drill and Portable Air Compressor shown in photograph have moved nearly 80,000 yards of gypsum rock, working on 24-hour service. The compressor has operated the entire time without a forced shutdown, and with no replacement parts needed. The UMB drill has needed replacement only of a broken exhaust control valve spring. "We're pleased," says Mr. Stamey, who is in charge of the job, adding that he also uses Gardner-Denver S-35 Sinking Drills for block-holing.

Another aid to fast, economical work—the Gardner-Denver WDS Wagon Drill. Drills holes in practically any position..12-ft. steel changes.

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60th ANNIVERSARY YEAR

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Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Co.
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Link-Belt Co.
Roebling's, John A., Sons Co.,
Sauerman Bros., Inc.

Calcining Equipment
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Capacitators
General Electric Co.

Capstans
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Block, Dump, Industrial, Etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Bethlehem Steel Co.
Chase Foundry & Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Eagle Iron Works
Link-Belt Co.
Multiplex Concrete Mach. Co.
Ransome Concrete Machy. Co.
Sanford Day Iron Works
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.

Car Dumps
Eagle Iron Wks.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Car Pullers & Movers
American Hoist & Derrick Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Car Wheels
Bethlehem Steel Co.
Chase Foundry & Mfg. Co.
Eagle Iron Works
Link-Belt Co.
Sanford-Day Iron Works

Carts (Concrete)
Blaw-Knox Co.
Jaeger Machine Co.
Link-Belt Co.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.

Castings
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Co.
Bethlehem Steel Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Steel Foundry Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works (Grey Iron)
Frog, Switch & Mfg. Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Plants (Contractor)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
F. L. Smidth & Co.
Traylor Engineering & Mfg Co.

Cement Colors
Mepham, Geo. S., Corp.
Ricketsen Mineral Color Wks.

Cement Plants
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Chain Belt Co.
Heltzel Steel & Iron Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Straub Mfg. Co., Inc.

Chain (Elevating and Conveying)
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Link-Belt Co.
Straub Mfg. Co., Inc.

Chimney Block Machines and Molds
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Chutes (Bin, Truck, Concrete, Etc.)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earl C., Inc.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Fuller Co.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Chute Liners
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
Allis-Chalmers Mfg. Co.
General Electric Co.

Circuit Testers
Atlas Powder Co.
General Electric Co.

Clarifiers
Chain Belt Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
Nordberg Manufacturing Co
Pioneer Engineering Wks., Inc.
Raymond Pulv. Division Research Corp.
Simplicity Engr. Co.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.
Universal Vibr. Screen Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Classified Directory (Cont.)

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Combustion Engineering Corp.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Concentrators
Straub Mfg. Co., Inc.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co
Ransome Concrete Machinery Co.
Stearns Mfg. Co.
Straub Mfg. Co., Inc.

Controllers (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.

Converters (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Conveyors (Belt)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Chicago Steel Foundry Co.
Fuller Company
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
F. L. Smidth & Co.
Smith Engineering Works
Stearns Mfg. Co.
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Overhead)
Chain Belt Co.

Conveyors (Pan)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Company
Raymond Pulv. Division

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.

Conveyors (Screw)
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Trolley)
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Coolers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Coolers (Clinker)
Fuller Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Correcting Basins
Smidth, F. L., & Co.

Cottrell Precipitators
Research Corp.
Western Precipitation Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel Electric Steam, Etc.)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.

Cranes (Overhead Traveling)
Industrial Brownhoist Corp.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Cranes (Truck)
Thew Shovel Co.

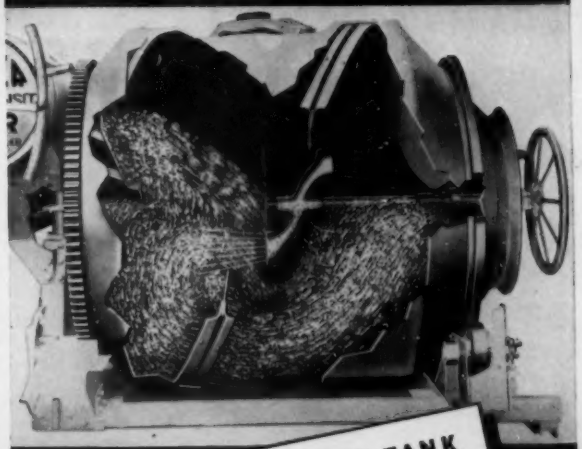
Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Koehring Co.
Link-Belt Co.
Thew Shovel Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Traylor Engr. & Mfg. Co.

Crushers (Cone)
Nordberg Mfg. Co.
Smith Engr. Works

They're Buying Jaegers because

JAEGER ALONE Builds This MODERN TRUCK MIXER....



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Accurate within a fractional per cent of tank capacity regardless of tank position or splashing on roughest roads — a 1939 improvement.

DUAL REVOLVING WATER SPRAYS 2.

100% faster, uniform water distribution — clear path as they revolve, spray into and over mass in both directions, from end to end of drum — insure thoro mix even on shortest hauls — a 1939 improvement.

MORE SALABLE CONCRETE 3.

Jaeger Reversing End-to-End Mix, plus accurate measurement and more rapid and uniform distribution of water, produce recognized higher strength concrete, give Jaeger operators a basic sales advantage. Bulletin TM-39 gives up-to-the-minute information. Send for your copy.

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603 Dublin Ave. Columbus, Ohio

This EAGLE SCREW WASHER turns waste into PROFIT.....

Before installation of this 18-inch double screw EAGLE WASHER only gravel was produced at this plant — the sand being pumped back into the lake, a total loss.

This is a typical example of how EAGLE WASHERS turn deposits which were formerly considered unprofitable into real money-makers. They thoroughly wash and scrub the aggregate, eliminating all mud, sticks, leaves, silt, coal, shale and clay balls. The finished product can meet the most rigid specification requirements.

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All EAGLE WASHERS are built of the finest quality material to assure low operating cost, large capacity and long life.

Write for descriptive literature today.

EAGLE IRON WORKS

DES MOINES, IOWA

Classified Directory (Cont.)

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Austin-Western Road Machy Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Dixie Machy. Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Straub Mfg. Co., Inc.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Brooks Equipment & Mfg. Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machy Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co
Pioneer Engineering Wks., Inc.
Rogers Iron Works Co.
Smith Engineering Works
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Brooks Equipment & Mfg. Co
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Rogers Iron Works
Smith Engineering Works
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy Co.
Eagle Iron Wks.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Works
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing and Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Rogers Iron Works
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Tyler, W. S. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Decks, Vibrating Screen
Hendrick Mfg. Co.

Dedusters
Blaw-Knox Co.
Western Precipitation Co.

Dehydrators
Pioneer Engr. Works, Inc.

Derricks
American Hoist & Derrick Co.
Hayward Company

Detonators
Atlas Powder Co.
Ensign-Bickford Co.

Dewatering Machines
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Eagle Iron Wks.
Hardinge Co., Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Diaphgrams (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Koehring Co.
Link-Belt Co.
Marion Steam Shovel Co.
Thew Shovel Co.

Disentegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

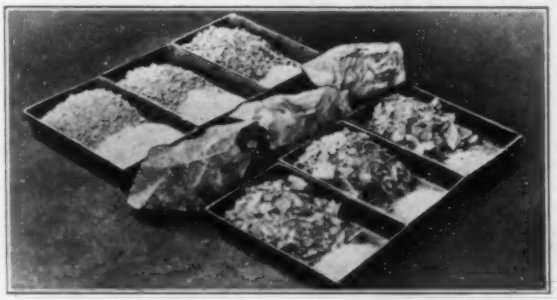
Dragline & Cableway Excavators
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.

KUE-KEN Balanced Crushers Use Far Less Power

The No. 20 has a receiving opening of 6"x12". On a 3" to 6" feed, no "fines," the capacity is 22 tons per hour to 2" with only 5 H.P. With the same feed and jaws set at ¼" the capacity is 5 tons per hour with 11 H.P.

The No. 50 has a receiving opening of 9¾"x24". On a 4" to 9½" feed, no "fines" the capacity is 55 tons per hour to 3" with only 15 H.P. With the same feed and jaws set at ¼" the capacity is 15 tons per hour with 35 H.P.

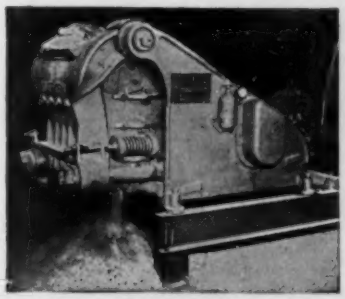
These capacities were checked with stop watches and power readings were recorded electrically. The material was medium hard quartz. Some of the pieces fed to the larger machine weighed as much as 90 lbs.



The illustration shows a typical feed for a KUE-KEN crusher. Material in pans shows products obtained with "single pass" crushing at different jaw settings. White portion is minus 8 mesh.

No Abrasion Between Jaws
Large Reduction Ratios
Perfect Balance
Small Foundations
Lowest Bearing Pressures
Dust Tight Oil Bath
All Steel Construction
Light Weight With Strength

Send today for Bulletin 600. Describes and gives capacities and power required for several sizes. Also contains information on free crushing test service.



Crusher under full load mounted on light steel frame not even fastened to floor. All mechanism runs in cool filtered oil bath.

STRAUB MFG. CO. 512 CHESTNUT STREET OAKLAND, CALIFORNIA

For Bigger Output at Lower Costs

The value of our forty years experience in building better buckets is best demonstrated by the enthusiastic comments of their owners. Here is a typical letter. "We are handling more coal with our new Industrial Brownhoist 1¼ yard Clamshell than we ever did with our old 2-yard bucket."

Because the new Industrial Brownhoist buckets are designed to meet today's material handling problems, increased production and profits invariably result wherever they are used. Built in capacities of ½ to 15 yards and in Rope-Reeve, Power-Wheel, Lever-Arm and Link-types.

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INDUSTRIAL BROWNHOIST *Clamshell Buckets*

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Frankly, we've never seen another like it. Not a catalog—it's a "Photolog"—using large, detailed photographs to illustrate each point—leaving nothing to your imagination. We believe you'll find it the most easily read and the most convincing piece of truck mixer literature you have ever seen. Whether you have one truck mixer or ten, or have yet to buy your first—you'll find this book a real help to you in getting the lowdown on the last word in truck mixer design!

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1649 W. Bruce St.
Milwaukee, Wis.

REX MOTO-MIXERS

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Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.
Thew Shovel Co.

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc.
Link-Belt Co.
Marion Steam Shovel Co.
Straub Mfg. Co., Inc.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Wks.
Hetherington & Berner, Inc.

Dredge Hulls
Chicago Bridge & Iron Co.
Eagle Iron Works

Dredging Sleeves
Hetherington & Berner, Inc.
Thermoid Rubber Co.

Drilling Accessories
Bucyrus-Erie Co.
Gardner-Denver Co.

Drill Bits
Bucyrus-Erie Co.

Drill Sharpening Machines
Bucyrus-Erie Co.
Gardner-Denver Co.

Drill Steel
Bethlehem Steel Co.
Gardner-Denver Co.

Drills (Blast Hole)
Bucyrus-Erie Co.
Gardner-Denver Co.

Drills (Hand Hammer)
Gardner-Denver Co.

Drills (Rock)
Bucyrus-Erie Co.
Gardner-Denver Co.
Jeffrey Mfg. Co.

Drills (Wagon)
Gardner-Denver Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt, Chain and Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engineering Corp.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulv. Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.
Research Corp.
Western Precipitation Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Buell Engineering Co., Inc.
Chicago Bridge & Iron Co.
Hendrick Mfg. Co.
Raymond Pulv. Division
Research Corp.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Western Precipitation Co.

Dust Collector Bags
Blaw-Knox Co.
Sly, W. W., Mfg. Co.

Dust Conveying Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Company
Raymond Pulv. Division
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

Dust Precipitators
Research Corp.
Western Precipitation Co.

Dust Recovery Plants
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

Dynamite
Atlas Powder Co.

Electric Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Hayward Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevators
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Fuller Company
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co., Inc.
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Productive Equipment Corp.
Robins Conveying Belt Co.
Rogers Iron Works
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gasoline, Kerosene and Oil)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Caterpillar Tractor Co.
Cummins Engine Co.
National Supply Co.
Nordberg Mfg. Co.

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Exhausters
Combustion Engineering Corp.
Raymond Pulv. Div.

Explosives
Atlas Powder Co.

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Sly, W. W. Mfg. Co.
Smidth, F. L., & Co.

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Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Kent Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Stearns Mfg. Co.
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.

Filter Cloth
Roebling's, John A., Sons Co.,
Tyler, W. S., Co.

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Dewey & Almy Chemical Co.

Fly Ash Collectors
Research Corp.
Western Precipitation Co.

Forges
Gardner-Denver Co.

Forgings
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Laughlin, Thomas, Inc.

Frogs & Switches
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co.

Fume Collectors
Research Corp.
Western Precipitation Co.

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General Electric Co.

Fuse Cutouts
General Electric Co.

Fuse Cutters
Ensign-Bickford Co.

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Atlas Powder Co.
Ensign-Bickford Co.

Fuse (Electric)
General Electric Co.

Fuse Lighters
Ensign-Bickford Co.

Galvanometers
Atlas Powder Co.
General Electric Co.

Gas Scrubbers
Research Corp.
Western Precipitation Co.

Gasoline
Gulf Refining Co.
Texas Company

Gas Producers
Blaw-Knox Co.

Gear-Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Link-Belt Co.

Gears
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Frog, Switch & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Generators & Motor Generator Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
National Supply Co.
Nordberg Mfg. Co.

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Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Owen Bucket Co.

Grating
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Eagle Iron Works
Hendrick Mfg. Co.

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Bacon, Earle C., Inc.
Gulf Refining Co.
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Link-Belt Co.
Robins Conveying Belt Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
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Hendrick Mfg. Co.
Tyler, W. S., Co.

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Jeffrey Mfg. Co.
Link-Belt Co.

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Jeffrey Mfg. Co.

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Eagle Iron Works
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Jaeger Machine Co.
Jeffrey Mfg. Co.
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McLanahan & Stone Corp.
Nordberg Mfg. Co.
Northwest Engineering Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engr. Wks.
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.

Hoppers
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Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works
Traylor Engineering & Mfg. Co.

Hose (Sand Blast)
Sly, W. W., Mfg. Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Dixie Machinery Mfg. Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Sly, W. W., Mfg. Co.
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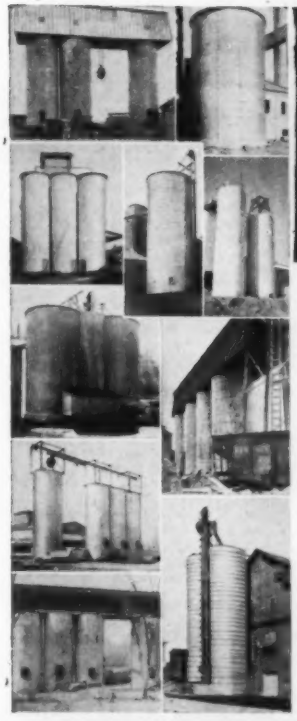

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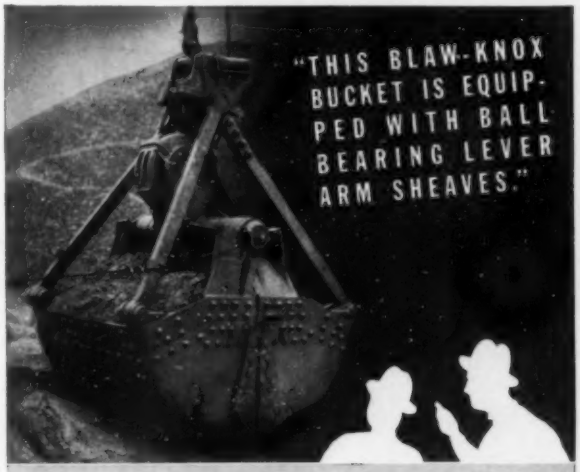

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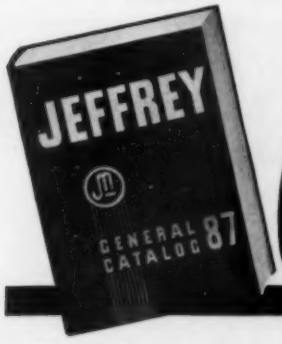

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Hardinge Co., Inc.
Traylor Engineering & Mfg. Co.

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Besser Mfg. Co.

Kiln Burners
Babcock & Wilcox Co.
Smidth, F. L., & Co.

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Smidth, F. L., & Co.

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Traylor Engineering & Mfg. Co.

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Ross Screen & Feeder Co.
Stearns Mfg. Co.

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Loaders (Underground)
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Nordberg Mfg. Co.
Thew Shovel Co.

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Locomotives (Diesel-Electric)
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Lima Locomotive Works, Inc. (Locomotive Div.)

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Locomotives (Kerosene)
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Locomotives (Oil & Oil-Electric)
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Locomotives (Steam)
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Jeffrey Mfg. Co.
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Traylor Engr. & Mfg. Co.

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Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

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American Pulverizer Co.
Babcock & Wilcox Co.
Brooks Equipment & Mfg. Co.
Combustion Engineering Corp.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
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Columbia Steel Co. (U. S. Steel Corp. Sub.)

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Chain Belt Co.
Link-Belt Co.

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Sly, W. W., Mfg. Co.

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Smidth, F. L., & Co.

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Gulf Refining Co.
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Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Commercial Shearing and Stamping Co.
Multiplex Concrete Machy Co
Stearns Mfg. Co.

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McLanahan & Stone Corp.
Traylor Engineering & Mfg. Co.

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Harrington & King Perf. Co
Hendrick Mfg Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Joseph T. Ryerson & Son, Inc.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.

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Jeffrey Mfg. Co.
Link-Belt Co.

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Jaeger Machine Co.

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Link-Belt Co.
Robins Conveying Belt Co.
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Nordberg Mfg. Co.

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Research Corp.
Western Precipitation Co.

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Link-Belt Co.
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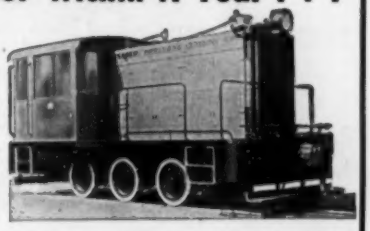

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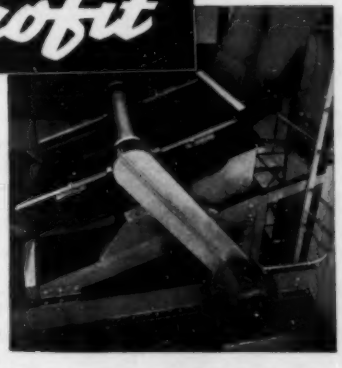

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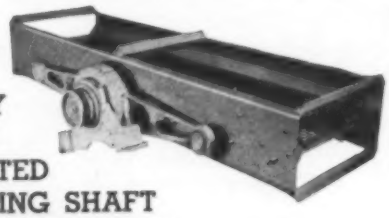

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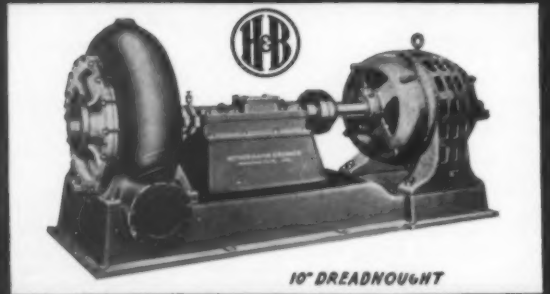

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Steel (Special Alloy)
Chicago Steel Foundry Co.

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.
Link-Belt Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Jeffrey Mfg. Co.
Kern, Fred T., Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Stucco Colors
Mepham, Geo. S., Corp.

Switchboards
Allis-Chalmers Mfg. Co.
General Electric Co.

Tachometers
General Electric Co.

Tampers (Power & Hand)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machy Co.
Stearns Mfg. Co.

Tanks (Air, Storage, Etc.)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engineering Corp.
Eagle Iron Works
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Raymond Pulv. Division
Traylor Engineering & Mfg. Co.

Testing Instruments
General Electric Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Hendrick Mfg. Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track & Truck Equipment
Besser Mfg. Co.
Chase Foundry Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp. Sub.)
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Jeffrey Mfg. Co.
Link-Belt Co.

Tractors
Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.
Koehring Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial & Quarry)
Allis-Chalmers Mfg. Co.
Austin Western Road Machy. Co.
Ford Motor Co.
Koehring Co.
Sanford Day Iron Wks.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.

Truck Bodies (Dump)
Commercial Shearing & Stamping Co.
Dempster Bros.
Ford Motor Co.
Hendrick Mfg. Co.

Trucks (Agitator)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Smidth, F. L., & Co.

Trucks (Dump)
Chase Foundry & Mfg. Co.
Ford Motor Co.

Trucks (Hand)
Chase Foundry & Mfg. Co.

Trucks (Industrial)
Chase Foundry & Mfg. Co.

Trucks (Mixers)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.
Smidth, F. L., & Co.

Turbines
Allis-Chalmers Mfg. Co.
General Electric Co.

Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Chain Belt Co.
Fuller Company
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.

Unloaders (Boat)
Chain Belt Co.
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

Unloaders (Pneumatic)
Fuller Company

Unloaders (Underground)
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.
Tyler, W. S., Co.

Vibrating Screens
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Eagle Iron Wks.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Screen Equipment Co.
Simplicity Engr. Co.
Smith Engineering Wks.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Koehring Co.

Washers (Log)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Chicago Bridge & Iron Co.
Eagle Iron Works
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engineering Wks.
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg. Co.

Classified Directory (Cont.)

Tyler, W. S., Co.
Universal Vibrating Screen Co.

Weighing Equipment
Blaw-Knox Co.
Chain Belt Co.
Fuller Company
General Electric Co.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Welding & Cutting Equipment
American Steel & Wire Co. U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
General Electric Co.
Ransome Concrete Machy. Co.
Roebling's, John A., Sons Co.,

Welding Electrodes
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)

Welding Rods
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.

Welding Wire
American Chain & Cable Co.
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Div.
Roebling's, John A., Sons Co.,

Winches
American Hoist & Derrick Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.,
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Wire (Copper, Iron & Steel)
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
General Electric Co.
Roebling's, John A., Sons Co.,

Wire (Electric)
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
General Electric Co.
Roebling's, John A., Sons Co.,

Wire Rope
American Cable Co., Inc.
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Div.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co.
Roebling's, John A., Sons Co.,

Wire Rope Clips
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Div.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co
Roebling's, John A., Sons Co.,

Wire Rope Coatings
American Steel & Wire Co. (U. S. Steel Corp., Sub.)

Wire Rope Fittings
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Div.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co.
Roebling's, John A., Sons Co.,

Wire Rope Hooks
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Hazard Wire Rope Div.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co
Roebling's, John A., Sons Co.

Wire Rope Lubricants
American Steel & Wire Co. (U. S. Steel Corp., Sub.)
Columbia Steel Co. (U. S. Steel Corp., Sub.)
Roebling's, John A., Sons Co., Texas Co.

Wire Rope Slings
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American Steel & Wire Co. (U. S. Steel Corp., Sub.)
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Columbia Steel Co. (U. S. Steel Corp., Sub.)
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Roebling's, John A., Sons Co.,

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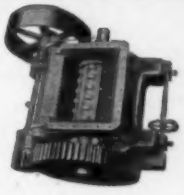

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Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

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Complete portable, semi-portable and stationary crushing, screening, and washing plants for different capacities of any materials.

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for Slurries, Sand Tailings, Slimes, Acid Sludges

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Sauerman Crescent Scraper is the most economical device in the world for storing and reclaiming aggregate, and also for pit and bank excavation.

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Excavation of sand and gravel—open storage of aggregate—handling of cement clinker—haulage of quarry products to crusher—these and many other material handling jobs are accomplished cheaply by means of Sauerman Drag Scrapers and Cableways.

Throughout the rock products industry, Sauerman machines are rated as a most valuable plant asset because of their ability to move materials with a minimum expenditure of power and labor.

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Sauerman Slackline digs a pit 1000 ft. wide and 100 ft. deep, lifting material to top of plant at a cost of a few cents per cubic yard.

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42x48" Traylor; 24x36" Allis-Chalmers; 24x36", 18x36", 30x15" Farrel.

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4' Traylor No. 410 TZ, 100 t.p.h., ¾"; No. 19, 25, 37, 49 Kennedy; 5" Newhouse with 40 H.P. motor; 2' Telsmith Gyrasphere.

BELT CONVEYORS

(One) 20" x 212' ROBINS Timken equipped 253 XR idlers on steel channel bases, all mounted on steel frames in 20 ft. sections, complete with motor drive through Falk gear reducer and gravity take-up.

128 Troughing Idlers and 52 Return Idlers, for 18" Conveyor.

CRANES AND SHOVELS

1—25-ton **Browning Locomotive Crane,** double drums, 50' boom, standard gauge, 160-pound ASME boiler—new 1938.

1—Lima Model 602 Gasoline driven Crawler shovel, 1½-yd. dipper.

1—NORTHWEST Model 73 Shovel, 2 yard, like new.

Visit our 8-acre Newark Shops on your way to the N. Y. World's Fair

1—100-B BUCYRUS Electric Shovel, Ward Leonard control, 3 yd. dipper.
1—100-B BUCYRUS Steam Shovel, 3 yd. full revolving.
1—No. 8C BROWNING Locomotive Crane, 25 ton capacity, 50' boom, standard gauge, double drums, 160 lb. ASME boiler.
1—75B Lorain 1¼-yd. Gasoline driven Shovel. 1935.
1—Marion ¾-yd. All Electric Model 21 Crawler Shovel.
1—Marion 450 Combination Shovel and Crane, 1¼-yd. dipper, 50' crane boom.
1—Marion 371 Dragline Crane, 1¾-yd.
1—"GENERAL" ½-yd. Caterpillar Shovel and Crane.
1—Bucyrus 50-B 2-yd. Shovel.

SPECIAL OFFERINGS IN PLANT CLEAN-OUT:

2—4-roll Raymond High Side Pulverizers.
1—5x30' Ruggles-Coles Direct Heat Rotary Dryer.
1—30x54" Ocala Single Roll Crusher.
1—No. 4 Williams Jumbo Hammer Mill.
8—18" Belt Conveyors, various lgths.
2—40' Bucket Elevators, 9x18" buckets.
1—No. 30 Caterpillar Tractor.
1—60 H.P. Fairbanks-Morse Diesel Engine.
1—10x8 Ingersoll-Rand Air Compressor.
1—6" Blast Hole Drill, Loomis, "Clipper wire line, gasoline driven, traction.

VIBRATING SCREENS

7—Jeffrey Traylor Vibrating Screens—Electric; 2 FB-2, 41"x6'; 5 FB-4, 4'x 7'. Also three Motor Generator Sets for these screens.

2—Niagara 4x8' double deck; 4x8' Robins double deck; 4—3x6' Sturtevant M-V, double deck; Tyler Hummer 3x5, 4x5, 4x7.

1—Rotex "Jumbo" with 2—3x11' 3-deck, on common frame.

3—ROTARY SCRUBBERS, GOOD ROADS, 4'x6', 2—4x8' each with 20 H.P. motor.

2—WASH BOXES, 18' c/c with 3' blades; 24' c/c with 4' blades.

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2—310' Ingersoll-Rand Portables, on AB Mack trucks, dual pneumatic tires; also 2—220 CFM., same mounting.

2—POC 2 I-R Diesel driven 550 CFM., 100 lb.

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8—Direct Heat; 3x20', 4x30', 5x26', 5x30, 6x40, 6x60, 8'8x85'.

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¾ yd. Northwest No. 3 Shovel & Dragline. Rebuilt.
140 HP Fairbanks Morse "32" Diesel with Clutch.
40 HP Fairbanks Morse "VA" Diesel. Belt drive.
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45 ton Plymouth Gas-Elec. Locomotive. New 1932.
20 ton Whitcomb std. gauge Gasoline Locomotive.
16x12" Sullivan & 14x10" I-R Air Compressors.
All Sizes—Crushers—Shovels—Cranes—Compressors.

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PIONEER 300-W portable wheel type sand & gravel crushing, screening & washing plant, complete.
UNIVERSAL duplex portable rock crushing & screening plant, complete, cap. 120 tons hr.
LOCOMOTIVE, 12 ton, Cinn. std. ga. gas, M.C.B.; $1675.
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BYERS ½-yd. diesel shovel—$3000.

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9—24x36" Farrell, 30x42" Buchanan type C, 24x72" Traylor Jaw Crushers.
40x15" and 54x24" Anaconda Crushing Rolls.
16, 18, 19 & 21 ton 36" ga. Saddle Tank Locomotives.
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200 HP Fulton Diesel Generator Sets 2300-220V.
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Vibrating Screens, all makes and sizes.
Shovels, Cranes, Steam, Gasoline, Diesel, Draglines.
Anything and everything for quarry operation.
Let us have your inquiries and ask for Bulletin No. 45.

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15" Electric Steel Hull Portable Dredge
10" Steel Hull Portable Hydraulic Dredge
20" Dredge Pump, New

H. P. GUION

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Portable and stationary, belts with elec. or gas power, sizes from 2 cu. ft. to 1,000 cu. ft.

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8—2 compart.: 1—118 ton Blaw Knox; 2—80 ton Heltzel; 1—54 yd. Johnson; 1—60 ton Butler; 2—35 ton Blaw Knox; 1—26 ton Heltzel. With or without weigh batchers.

1—1,200 bbl. Blaw Knox round bulk cement bin with 2,000 lb. weigh batcher.

1—275 bbl. Johnson port. bulk cement plant with 1,000 lb. weigh batcher, bucket elevator and car unloader.

BUCKETS

35—Williams, Blaw Knox & Owen clamshell, all sizes & types.

5—Dragscrapers: 1—1 yd. Sauerman 1½ yd. Omaha; 5—Page; 1—1½ yd. class C; 2—1¼ yd. class C; 1—1 yd. class M; 1—⅝ yd. class C.

5—Dragscrapers: 1—1 yd. Sauerman LeClair; 1—1 yd. Green; 2½ yd. Green & Garat; 1—½ yd. Sauerman.

CRANES, DRAGLINES & SHOVELS

1—P&H mod. 650 ser. No. 4188, 65' box type boom, 1¼ yd. bucket.

2—Northwest mod. 104, ser. Nos. 2079 & 1597, 45' boom, 1¼ yd. bucket; one with 1 yd. shovel attachment.

1—Link Belt K-42, ser. No. 1265, 45' boom, 1¼ yd. bucket; also have 1 yd. trench hoe attachment or 1¼ yd. shovel front.

2—Northwest mod. 105, ser. Nos. 2053 & 1522, 40' boom, 1 yd. bucket.

1—Link Belt K-1, ser. No. 1024, 50' boom, 1 yd. bucket.

1—Moore Speed Crane, ser. No. 179, 60' boom, ¾ yd. bucket.

1—P&H mod. 206 with 42' boom, ¾ yd. bucket.

2—Osgood Heavy Duty, ser. Nos. 2069 & 2087, 40' boom, 1 yd. bucket & one with 1 yd. shovel attachment.

2—Thew mod. O gas shovels, ser. Nos. 2801 & 2687, ¾ yd. shovel fronts—with 40' crane boom.

1—Universal mod. 35, ser. No. 1200, 56' boom, ⅝ yd. bucket.

1—Byers Bearcat mod. 37, ser. No. 3299, 30' boom, ½ yd. bucket.

CRUSHERS

4—Jaw Crushers: 1—12x26" Champion; 1—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9-A; 1—9x15" Champion.

4—Gyratory; 1—No. 20 Kennedy; 1—Weston 36-B fine reduction type with 50 HP motor. Cap. 90 TPH of 1" mat. 1—No. 3 McCully; 1—No. 0 McCully

1—Set of Allis Chalmers smooth type crushing rolls, 42x16".

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8—Steel stiff leg: 1—20 ton Overland 110' boom; 1—20 ton Just, 77' boom; 1—15 ton Just, 65' boom; 1—15 ton Clyde, 50' boom; 1—15 ton Clyde "A" frame barge derrick, 50' boom; 1—10 ton Insley 80' boom; 1—7½ ton, 120' boom; 1—5 ton Insley 80' boom.

6—Steel guy derricks: 1—15 ton Terry, 115' mast, 100' boom; 1—10 ton American, 115' mast, 100' boom; 3—6 ton Bedford, 90' mast, 80' boom; 1—5 ton Dobbie, 70' mast, 58' boom.

TRACTORS & SCRAPERS

4—13 cu. yd. LeTourneau Carryall scraper outfits with caterpillar Diesel RD-8 tractors; serial Nos. 3052, 3066, 3068, 3071.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 8D Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

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Johnson concrete batching plant, complete, 100 yds. cap. with 200 bbl. cement bin, elevator, screw conveyor, etc. New 1937.
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1 250 yd. 2 compartment Butler steel bin.
300 bbls. Heltzel cement bin, screw conveyor, elevator.
2 Smith 1 yd. tilting concrete mixers, water tank, hopper, and telltale, electric motor driven.
1 Fuller Kinyon Type B portable cement loader.
1 Fuller Kinyon rotary air compressor.

CRUSHERS—JAW—CONE—GYRATORY

Jaw—4x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36.
Gyratory—Gates K, Nos. 4, 5, 6, 7½D, Kennedy Van Saun, Nos. 30, 37, 37S, 49, McCully Nos. 5, 6, McCully Superior 8".

CRANES—SHOVELS—DRAGLINES

1 Clyde Whirley, 30 tons cap., 105' boom, oil fired steam.
1 Bucyrus Erie steam shovel, 2 yds. capacity.
1 Marion No. 450 gas-electric shovel, 1¾ yd. cap. Guaranteed.
1 Browning, electric loco. crane, 15 tons, 45' boom.
1 43B Bucyrus Erie Diesel shovel 2 yds.
1 Lima, gas, caterpillar, 1¼ yds., crane-dragline.

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1—Williams Hercules 1½ yd. digging clamshell. NEW.
1—Owen ½ yd. clamshell digging bucket, type M.
1—Hayward ¾ yd. orange peel.

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Barber Greene conveyors, 24", steel frames electric drive, 35' to 45' type N.
Belt conveyors, complete, steel frames, belt and motors, 24" lengths, 45' to 200'.
Conveyor belt, 18", 20", 24", 30".
Head & tail pulleys, take-ups, rollers, idlers.

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5—Mack Model AB dump trucks pneumatic.
Dredge pumps, 6", 8", 10", 12", 16".
Gas locomotives, 2½ to 35 tons.
V type, side dump steel cars, 2 & 3 yds., 36" ga.
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Clyde 3 drum hoist and swinger, electric, 75 h.p.
1—8'x6' Vibrating Screen, 3 deck, K. V. S.
1—8'x6' Vibrating Screen, single deck, K. V. S.
1—Lawrence centrifugal pump, 8" x 8" gas, portable.
1—Double drum steam hoist, 8¼ x 10, code boiler.
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RICHARD P. WALSH CO.
30 CHURCH STREET, NEW YORK, N. Y.

FOR SALE

Model 70 Marion steam shovel 2½-yard bucket, workable condition.
Two 27 ton American locomotives, standard gauge.

Can be seen at Osborn, Ohio.

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Reconditioned pipe, new threads and couplings, all sizes, ¾ in. to 36 in., guaranteed suitable for all practical purposes.

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200 KW G.E., 550 V., 2300/4000 A.C., 1200 RPM
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REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36" TZ, 8", 10", 12" Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.
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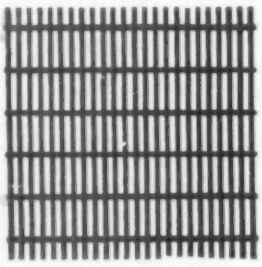

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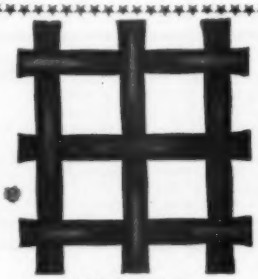

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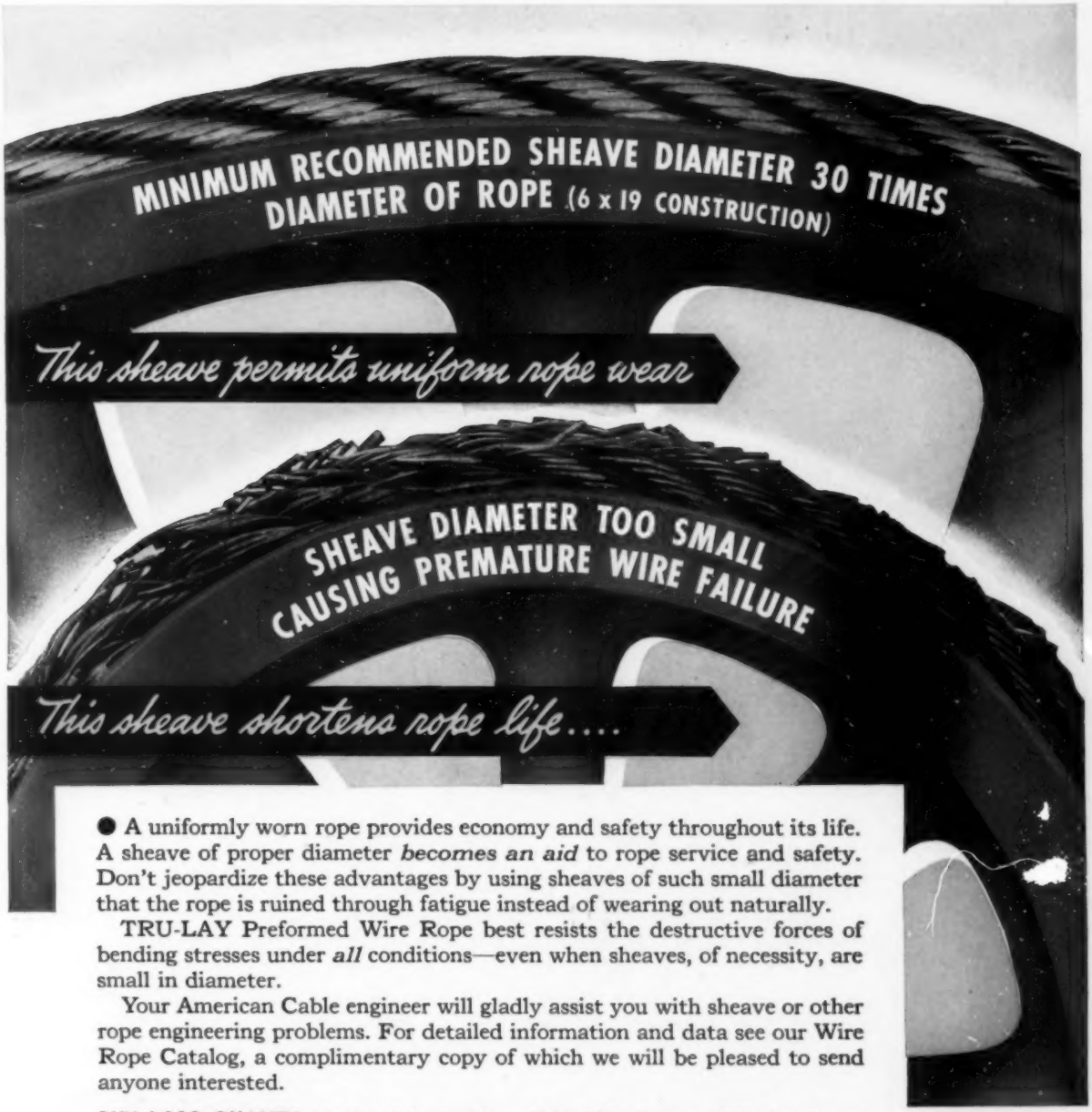
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